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The INDUSTRIAL-ARTS MAGAZINE

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INDUSTRIAL-ARTS MAGAZINE

Volume X DECEMBER, 1921 Number 12

AN ELEMENTARY CLASS IN MODELING AT THE NORTH BENNET STREET INDUSTRIAL SCHOOL, BOSTON.

Education in Decorative Plastic Art

George C. Greener, Boston, Mass.

IT is a blessing that in this often abused age of machinery, there are still some trades open to a man of initiative in which the work of his hands need not be remote from the interest of his mind. Joy of creating, of using imagination and individual ideas, pleasure in line, form and color, and the satisfaction of making objects both useful and ornamental—all may be found in the wide and varied field of decorative plastic art.

Advantage of Industrial Course.

Such a craft, though it be also an art, cannot be learned at the academies. The courses in modelling which are given by the academic art schools, educate the student for free creative activity, but do not prepare him for work in decorative art shops. On the other hand, the usual and direct way of approach to the craft is to enter a shop when young, as an unskilled apprentice to older workers in carving, modelling and the like. To be sure even the lowest stages of an art-craft are absorbing and depend on individual skill, in contrast to unskilled factory labor. Yet the apprentice who has never learned to draw or to handle clay cannot possibly grasp the principles of the craft or progress as fast as one who has had some elementary schooling and unless he has exceptional talent, he is doomed forever to work under a superior. For the man who is artist and craftsman in one, that is, he who can invent his own design, will be at the head of a decorative art establishment, and supervise and finish the work of his helpers. A boy who chooses plastic art for his lifework, though he may not have the remotest desire for fame and great artistic achievement, will yet have the natural ambition to rise to the top within his own sphere. As on the one hand most young men who would be likely to enter into this calling have neither the leisure nor the inclination to take an academic course such as the art schools offer, and as on the other hand mere apprenticeship without study and training does not lead to excellence and the desired success—it would be sad indeed if no compromise could be found. Yet such a middle course between abstract academic study, and immediate shopwork is offered by the North Bennet Street Industrial School. Courses in clay modelling are there given to school children from the fourth grade on through the eighth. But it is particularly the course in plastic art for adult pupils, given two evenings in the week, that prepares men for practical work in decorative art shops and at

the same time gives them a foundation for creative activity which may lead to future independence and leadership.

The Industrial Instructor.

The instructor, who conducts this course, is himself at the pinnacle of the plastic decorative art work in Boston. He is an accomplished artist, a versatile craftsman and the director of his own workshop. More than any academic instructor, he is peculiarly fitted to teach those who cannot afford a leisurely education and who aim toward practical accomplishment. Yet he is the first to insist that without education and training supreme achievement, even in practical art, is unlikely if not impossible. In his own boyhood, while he was still attending the grammar school in the morning, he went to one art school in the afternoon and to another in the evening—not, indeed, with any thought of future profit, but from sheer love of the work. This disinterested devotion in early youth won for him not only inner contentment but substantial outer rewards.

Handicap of the Uneducated.

It is a significant fact that older men who work in this instructor's own shop are taking his evening course. They have found that in spite of the constant occupation and intimate familiarity with their craft, they have missed something—the elusive something which prevents them from achieving what their diligence and earnestness seem to deserve. They have missed education. For years they have carved wooden angels and Madonnas, or chiseled acanthus leaves out of marble; but they may not know a Doric column from a Corinthian. The architect who gives orders for church or library decorations cannot confer with them, because they would not understand him. Therefore they must always be told by their more educated employer to do this and to do that, without hope of becoming their own task-masters. The training which these older men are trying to acquire now because they have realized the disadvantages of its lack, young men may wisely secure before they enter the same vocation.

The North Bennet Street Industrial Course.

The course which is offered at the North Bennet Street Industrial School follows the lines of activity which the young artist may expect to pursue in his later practical work. When an architect orders a decorative panel, the artist first draws the design for his sculpture, then makes a clay model which is shown to the customer; not until this pliable clay model, which can easily be changed, has proved quite satisfactory, is work begun upon the final product in wood, stucco or marble. Thus, accordingly, in the evening training course in wood-carving, the pupil is taught first to draw his design, then to make a clay model from the given pattern and finally to translate this design accurately into the more difficult medium. Of course, a certain ability to draw must be taken for granted in the modelling course; but the North Bennet Street Industrial School plans to offer drawing instruction also which shall precede the course in plastic art. Training in clay modelling is gained by copying from classic models, and in this way young men who may later never have leisure or initiative to study, will learn at least the rudiments of the historic language of lines and forms.

Benefits of Evening Course.

The instructor does not pretend that such an evening course can take the place of apprenticeship in a workshop with its constant practise. But he knows that the apprentice who has already passed through a course

SOME PIECES PRODUCED BY AN EVENING MODELING CLASS.

PART OF AN EXHIBIT OF STUDENTS' WORK, NORTH BENNET STREET INDUSTRIAL SCHOOL, BOSTON.

in modelling and wood-carving not only will learn faster than his less favored companion, but enters his craft better equipped for future independent achievement. If the young apprentice has not been able to take the course before he begins practical work, he may do so in the evenings of his working week. Then he will find the skill won by daily practise an advantage in his study, and the instruction and training offered in the course of great value in widening his perspective and deepening his attitude toward his own lifework in the school. Furthermore, he can be given a more complete training than in the comparatively one-sided work of his apprenticeship into which he may be forced by market conditions.

Forms of Expression.

The young man who has learned accurate clay modelling may associate himself with wood-carvers, with workers in stucco, or sculptors of stone. Some workshops include craftsmen in all mediums, but these are exceptions. The venerable but ever youthful art of wood-carving is represented in Boston by such firms as Ross Co., Forg & Miller, John Evans, Emery & Ross, and Charles Emery. If a young apprentice entering one of these firms has learned clay modelling, this schooling cannot fail to be an advantage, as models in clay are always made first, before the wood-carving is begun. If he has taken lessons in both clay modelling and wood-carving, he will have a double advantage.

Stucco.

For those who plan to work in stucco, the clay modelling is essential, as it represents the only artistic activity in this work, indeed, the final medium is gained through the mere mechanical process of casting. This less noble, but more accessible and adjustable medium is much in demand, and prospective workers in stucco should find ample opportunity in this field.

Finally the sculptor proper, who hews and chisels figures and ornaments from stone, cannot dispense with the training in clay modelling. The technique of mastering the stone cannot be taught in a school, because a yard is necessary in which to work upon the bulky blocks; this largely muscular accomplishment must be learned directly at a workshop. But the real artist, the director of the shop, composes his statue or decorative design in clay, and leaves the hewing of the marble or other stone to his helpers. By means of a pointing compass, the apprentice takes the exact dimensions of the original clay model and copies it in stone; then the artist applies his own chisel to the marble product and finishes it with the last individual and decisive touches. It is self-evident that a normally ambitious boy who enters—say the shop of John Evans or the Johnson Marble Co. of Boston, would rather play ultimately the role of the composing, directing and finishing artist than to remain satisfied to the end of his days with the rough work of stone-cutting. Training in composition, drawing and clay modelling is therefore as helpful to one whose medium will be marble as to those who intend to work in stucco or carved wood.

As the better educated have a greater opportunity for advancement, so they have also a better chance for increase in wages. In a typical shop, a young man has the chance of earning from $20 to $75 a week—if he enter with some previous art education. Otherwise unless he has exceptional talent, he must be content with less for some time, and do the best he can to compete with those who have had better advantages.

Attractiveness of Decorative Plastic Art.

The career of an artist, or craftsman, in the field of decorative plastic art offers many inducements, outside of the economic aspect. A boy with any sensibility must feel the difference between working in a noisy manufacturing plant where he represents only one small wheel in the big impersonal machinery, and creative work which he can watch grow from beginning to end, and in which the significance of even his own humble share can be fully estimated and appreciated. The beauty of the finished product will depend on the

harmonious cooperation of all who have laid hands upon the wood, clay or marble; and the youngest apprentice cannot fail to take pride in his share of its perfection. Moreover, instead of being surrounded by whirring machines—the craftsman sees round about him half-finished angel's heads, panels with carved rosettes or palm leaf designs, clay models still moist and pliant, or else merely the mute material which, however, is ready to burst into eloquence under the skilled touch of his hands. There is no monotony here among the jars of gold and silver paint, the palettes with bright colors, the seemingly infinite variety of tools which only he who uses them can understand; there is no dullness, no hopelessness. Yet if a craft is so attractive at the bottom of the career—how much more satisfying it must be at the top! This should be considered by every man who chooses to enter the field of decorative plastic art, and such consideration must lead inevitably to a training-course in drawing and clay modelling.

It will thus appear that such a training-course in modelling and wood-carving as is offered by the North Bennet Street Industrial School is valuable for boys and men who must enter the ranks of practical wage-earners, but who have chosen or contemplate choosing a craft which busies alike hand, mind and imagination of the craftsman and which may lead, with the necessary training and education, beyond craftsmanship to original art. The training-course bears directly upon the economic advantages of the worker in decorative plastic art, and upon the opportunities for his advancement which may culminate in his independent management of a workshop and, at the same time, in creative achievement. And the course, by laying a foundation in clay-modelling which has been found to be indispensable in all kinds of plastic art work serves equally the future wood-carver or modeller or sculptor.

PUBLIC SCHOOL CLASSES—CLAY MODELING.

Grade V.

I. Impression work (with thumb).
- leaves
- seeds
- sticks
- objects brought by pupils

II. Applied forms
- Resulting in
  1. Tiles
  2. Borders
  3. Designs for nail-heads, etc.

III. Simple pottery
- Shaped from the ball — Bowls
- Built up with coils — Candlesticks
- Built up with tablets of clay — Pen tray, Ink well, Boxes, etc.

Use for decoration—the symbols: rain, sun, river, mountain, etc. (incised designs.)
Polish after Indian fashion
Color with earth paints
Incised designs—Pupils cut paper designs at home for tiles

IV. Nature work in high relief
- leaf
- flower

V. Illustrative work—Fables, etc.—In relief / In the round

VI. Ten minute memory sketches

VII. Ten minute poses

Voluntary and spontaneous work encouraged.

Grades VI, VII and VIII.

Constructive Work.

I. From dictation
- Tiles built
- Tiles rolled
- Studies in relief — Prints and photographs shown; Pupils think of possible use for such designs
  1. The ball
  2. The Rosette — Pupils think where they have seen them

II. Applied forms — using larger forms than in the lower grades. Pupils express their own ideas as to elevation, shape, centre, etc.
- Wreath
- Rosette
- Finials
- Design to fill given space
  a. regular
  b. irregular

III. Work from Cast.
- In relief
- In the round
- Translating from the round to relief.

IV. Work from Nature
In relief—aiming at good composition
- The onion sprouted
- radish
- bananas
- leaves of large
- flowers form

V. Designs for
- Door knockers
- Door handles
- Drawer pulls
- Wreath
- Brackets

Study pictures and the M. F. A. Metal exhibit if possible

VI. Pottery
- Coiled
- From tablets
  - Flower pots
  - Candlesticks
  - Vases, jars, with covers and handles
  - Boxes, tiles, plant boxes
  - Food dishes for dog, cat, bird
  - Child's bowls

Decorate only well made pieces of good form
Aim at **good form** without decoration

VII. Illustrative work in relief and in round
- St. George and the Dragon — Fireplace tiles fitted into frame
- The Tar-baby
- The fables "Waiting" "Storm," etc. — Window box tiles.

VIII. Imaginative work
Grotesque masks—Dragons—Dolphins—Gargoyles.

IX. Lettering—Mottoes (See Mr. Mercer's titles)

X. Memory work—repeating a piece previously molded.
- Ten minute poses
- Ten minute memory sketches
  1. Something the teacher has just modeled.
  2. Something seen during the week.
  3. Something the teacher has asked to be observed.

According to season:
Foot-ball player, Thanksgiving, Christmas, Snow Scenes, Circus, Storm.

Observations and reports. Statues and Ornament seen in the street.

Collections for individual scrapbooks and the School Bulletin Board. News items and prints from magazines and newspapers.

Exercises: Think of some statue to be made for the city or nation. How would you do it? Take the pose. Why choose that pose?

Take the pose of any statue you have seen during the week. Who modeled it?

All spontaneous efforts encouraged.

Evening Classes in Clay Modeling.
Advanced Modeling.

Large work from the cast
- In high relief
- In low relief
- In the round

To be done well enough to be cast

- Enlarge details of ornament or
- Reduce the size

Model from flat copy

To be done well enough to be cast

Model from Memory

Sketches

Designs for—
- Drinking Fountain for animals, human folk
- Clock case
- Flag holder
- Doorway
- Electric lights upon the street corner
- Electric lights upon a building
- Letter box (Thing of the meaning that may be expressed)
- Fire alarm box.
- Gate post for—
  - School house
  - Garden
  - State house

Lettering—
- The name of a building
- A memorial tablet
- An inscription

Study—
- Styles of ornament and periods
- Talks on and visits to neighboring museums
- Lives of sculptors, etc.

Plaster Casting—
- Slip moulds
- Waste moulds
- Gelatine moulds

From pupils work

From life

Architectural Modeling.

Copying in clay from leaves (natural and ornamental).

Working from memory and from drawings and prints, enlarging and reducing details.

Instruction in the styles of ornament used on furniture and buildings of the different periods and countries.

Advice as to what kind of word is done by the different firms of the city.

Instruction in doing such work so that pupils may get and keep employment in such firms.

Special advice and instruction to meet particular cases.

Industrial-Arts and Prevocational Education in Our Intermediate and Junior-High Schools

ORGANIZING AND CONDUCTING REPRESENTATIVE ACTIVITIES

(ARTICLE II—Concluded)

A. H. Edgerton, Indiana University

Types of Industrial Arts Conducted in Smaller Communities—An Illustration.

Diversified Industrial Activities at Haslings, N. Y.[10] In the *seventh grade* at Hastings, N. Y., concrete construction is taken up as the main activity. Brief talks are given on the manufacture of cement early in the course. This naturally follows the story from the rough rock to the finished products, as developed in the shop. The forms for the simple concrete products involving mass construction are made from wood by the pupils. Some of the boys work individually on problems needed for the home, while others work in groups on larger projects, many of which are made for the school.

Running along parallel with the construction work, short talks are also given on the proper methods of preparing the forms for concrete, the kind of lumber to use, etc. The ingredients required to make concrete, their selection for desired mixtures, and methods of testing likewise are taken up and followed by the actual proportioning of materials, mixing, placing, depositing and protecting. After having completed projects in mass construction, reinforced and hollow construction problems are attempted. It has been the aim to have this work in the school shop of the same nature as the smaller construction work in the industry but as this is not possible in all cases with a small amount of equipment, trips are made occasionally to places where concrete construction is in operation. Notes are taken on the practical ways of doing this work on a larger scale.

In the *eighth grade* at this school, sheet metal work is introduced. Starting with the making of a simple biscuit cutter from a discarded soup can, the boys learn the principles of soldering. They have the experience of cutting and folding tin and soon become familiar with the metal working tools. A cup is then made, and the method of making a flange, or turning the edge, is explained. Coffee pots or watering cans have been found to be good problems for bringing in riveting. The making of spouts affords splendid opportunity for planning developments, as does the making of a funnel. Then after making a frying pan with a rolled edge from a round gallon can; each boy selects his projects and shows no end of interest in making up such problems as match boxes, lanterns, dust pans, stationary boxes, ash trays and such toys as automobile trucks, tractors, steam rollers, locomotives and boats. Figure III shows a few of these sheet metal problems.

The material for this work during the past year has consisted mostly of discarded tin cans. Several thousand of these have been brought in by the boys. Aside from the pleasure and knowledge derived from the actual making of the tin products, perhaps the greatest satisfaction lies in the fact that the boys are

[10]Contributed by Wm. H. Peters, Head of Industrial Arts Department, Hastings, N. Y.

using materials which usually are thrown away. You might say that this is making "something out of nothing" and thus eliminating bills which would otherwise be incurred. In this work the boys use their own initiative after being shown the simplest principles. Fig. IV shows a boy making bathroom fixtures for a doll-house. The combination of simplicity with the chance to use creative ability has proved of untold value. There was such a great amount of interest taken in this kind of work by the boys that many have asked to do extra work. As a result, many ingenious projects, some of which required a knowledge of mechanics, have been worked up.

In the *ninth grade* course electricity is introduced and sets of apparatus are made in order to cover the important principles of electricity. The constructions are made as simple as possible in order that the theory, given in talks parallel with the shopwork may be clear. As a first project, a simple telegraph sounder is made from a scrap of wood for a base, two twenty penny nails for the core of the magnet, a piece of tin (from an old tin can), which is folded and shaped for the armature. The key and switch are made from scrap pieces of tin and wood. When two boys have completed these instruments, they can get great interest in setting them up to form a complete telegraph system between two rooms. Next a buzzer is made of as simple construction as the sounder already described. This is followed by the making of a push button, which is as easily constructed as the key mentioned above.

Later a toy motor is introduced with good results. The experience of adjusting and hunting electrical trouble in this problem affords enough incentive to guide boys through the principles of the motor. After completing these problems, they select and make projects which are of particular interest to them. Many ingenious instruments have been turned out in the form of shocking coils, burglar alarm, wireless sets, etc. The boys seem to take a great interest in these problems, as well as in working out different experiments on an electro board which contains a number of possible hook-ups.

TYPES OF JUNIOR-HIGH SCHOOL INDUSTRIAL ACTIVITIES IN LARGE SCHOOL SYSTEMS.

Seventh Grade Industrial Arts at the Ben Blewett Junior High School, St. Louis, Mo.[11]

The shopwork at the Ben Blewett Junior High School, in St. Louis, Mo., is organized into two divisions: First, the seventh grade which has compulsory shop courses, and the eighth and ninth grades which are elective. After a boy has taken a year in the elementary shop, he then has an opportunity to choose between the technical arts, science, commercial, art, and classical courses. This report will, therefore, only discuss the *seventh grade shopwork and study.*

[11]Contributed by G. H. Hargitt, in charge of industrial-arts Classes at St. Louis, Mo.

This community, which is entirely residential and draws from a class of students whose parents, to a large extent, will encourage higher education, presents a problem which is quite different and difficult. Most of these children live in apartment houses, where they are deprived of the privileges of tinkering and experimenting in shops of their own. It is believed that all boys want or should have this experience, and for this reason, we are giving them this one big chance of their school career for guided experimenting.

We try to make a cycle of the material with which they work as much as possible, by encouraging that they first of all use wood as their medium of construction. This is followed by the use of sheet metal and soldering. Casting of soft metal in die-casting molds follows this, and finally they work in concrete and in electricity. We hope to have each and every boy come in contact with all these different media of construction some time during his work in the seventh grade.

The pupil, too, has the actual shop experience, with the added responsibilities of having complete charge of the issuance of tools in the tool room by means of a check system. He is made to feel that he is responsible for the tools and that he should see that they come back to the tool racks in as good condition as when they were given out. These are just further steps of the aim for making the boy feel that he is a part of the governing body, as well as the one to be subject to rule and order.

Wherever possible, it is the endeavor to have the work so arranged that the boys make use of their projects to help them pass their merit badge tests for the scout organizations and for clubs. All these things solicit closer cooperation of the boy by making him feel that there is a connection between all of these activities. A few excellent projects of this type are the chemistry sets, the heliograph, the telegraph set, the wireless, the naturalist's box, the level, and the chart board having the compass for charting the hikes made by the club.

Another project which proved its merits last spring was the organization of a Yacht Club previous to the races between the Shamrock and the Resolute. We studied the merits of the many types of sailing craft with reference to speed and ability to weather a storm. The boys became so enthused that they even conducted a few races among themselves and then discussed the merits and faults of the various boats.

The organizing of a Railroad Club, which ran through the whole of last year, was the most successful of our projects, not so much from the skill and technique of the project, as from the vast amount of information and satisfaction the boys derived from it. We elected the officers of the Railroad Corporation with its executive board, and this in turn had its subdivisions. There was a superintendent of road construction; a superintendent of block signals; one of the construc-

tion of cars; one for the engines, and one for the bridges. They met and decided upon the scale upon which to build the model railroad. A scale of one-half inch to the foot was agreed upon. They then proceeded to choose the helpers and assistants from the remainder of the club members and began on the development of the drawings and plans. A book of plans and specifications published by the Railroad Builders' Supply Companies, was procured and used as a guide. The boys made several trips to the railroad yards, switches, bridges and signalling towers. After watching the different operations of the parts in which they were interested, they brought information to the club which aided them in the construction of their projects. The benefits derived from these studies were not local entirely, as the boys in their enthusiasm solicited the interest and curiosity of the parents to the extent that many of them visited the meetings of the club and contributed of their knowledge and skill to aid in the construction of the main project.

Industrial Department of the Washington Junior High School, Rochester, N. Y.[12]

At Rochester, N. Y., the Washington Junior High School gives three types of industrial courses, which are called general try-out industrial, technical and vocational. The *general try-out course* is for boys in the 7A grade, since a general requirement in this grade is that every boy shall have one period of shopwork a day. The aim of this work is to give the boy a general idea of what industrial work is like, so that he will be able to make a more intelligent choice of his course when he enters the 8B grade. The *industrial technical course* fulfills a double purpose. It is both a prevocational training period and a general industrial information course. This course is elective for boys in the 8B grade or above, and it differs from the regular academic "foreign language" course only in the fact that one period a day of shopwork is substituted for the foreign language. The boys spend one term in a certain shop and then change to a different shop for the next term, so that at graduation from the Junior-High School they have a definite knowledge of at least five different kinds of industrial work. This course is preparatory for the regular high school and a *"cross-over"* may be made to other courses at any stage without loss of time.

The aim of the *Vocational Course* is primarily trade training, but, after completing a two years' course in this department, a boy may enter the Rochester Shop or Trade School and continue his work for three years, at the end of which time he obtains the State Industrial High School Diploma. A boy may enter this course at any time during the Junior-High School attendance provided he is over 14 years of age. Upon entrance, the boy and his parents choose the trade which he wishes to follow. He is then given a ten weeks' intensive try-out period in that particular trade. If he shows ability and, in the judgment of the instructor, will "make good", he continues in that kind of work for two years. If, on the other hand, the instructor believes that the boy is unfitted for the particular trade which he has chosen, he is then given another intensive try out in some other type of work. This try out scheme is carried on until the boy finds his niche or until it is definitely decided that he is by nature unfitted for industrial trade work. This course varies greatly from the industrial technical in that the boys do not carry on the regular junior-high school work. The day is divided into three hours of shopwork, one hour and a half of bookwork, including English, history, civics, and hygiene, 45 minutes of related shop mathematics, and 45 minutes of related mechanical drawing. It should be understood that the boys in this course are those who intend to drop out of school at 16, or before, and who desire an intensive trade training before going to work. Last spring over 70 per cent of the boys in this department were beyond the legal age for leaving school, and it is safe to say that nearly all of them would have left had they not been receiving definite trade training.

In order to care for these varying types of shopwork, the organization of the industrial department is somewhat complicated. Nine shops with eleven teachers now take care of all shop work. This is accomplished by using certain shops for vocational work half a day and for try-out work the remainder of the day. In addition to the shop teachers, the industrial department has two instructors for mechanical drawing and one for shop mathematics. At the present time, machine shop, electricity, and automobile repair are strictly vocational shops, while printing, mill work, pattern-making, sheet metal work, and painting and decorating are vocational one-half day and used for technical and try-out work only. One teacher in mechanical drawing is handling vocational classes only, while another is giving part vocational and part try-out drawing. The teachers of shop mathematics and vocational bookwork are handling strictly vocational groups. In no case are vocational boys and try-out boys combined in the same class.

The actual shopwork given in both try-out and vocational classes is done on standard practice machines and, so far as possible, parallels actual factory conditions of the better type. All work given is practical and usually of a productive nature. Production, however, takes a subordinate position, as it is never allowed to interfere with the all-round development of the boy. The industrial department in the school after all, is essentially a school rather than a factory.

It should be explained that these brief reports dealing with three widely varied types of successfully organized industrial arts courses at Hastings, New York, at St. Louis, Missouri, and at Rochester, New

[12]Contributed by R. Parkhill, vocational coordinator, Rochester, N. Y.

York, (as well as the several carefully planned and tried courses, units, and projects which are to appear in the next and last article of this series) were collected for the 1921 Yearbook by the Industrial Arts Committee[12] of the National Society for the Study of Education. Since it did not prove expedient for the Society to publish Part III of its 1921 Yearbook, which was to have included these suggestive contributions, it has been recommended and urged that, if necessary, this report on experiments for developing industrial courses and projects to meet the needs of early adolescence should be revised for publication in one of the leading current magazines. In order that all concerned might derive the most help from these valuable courses and projects, it has been decided to present them in connection with the findings and implications resulting from this investigation of 379 intermediate and junior-high schools.

While it is encouraging to note these marked improvements in methods and procedure, it certainly would be unwise at this time to consider any sterotyped plan as more than tentative. These promising results should point the way for further experimentation, which is certain to make more reliable comparisons and measurements possible. If industrial arts courses are to continue to occupy an important place in the program for general education, the relative possibilities in the different plans for realizing common objectives must be determined more scientifically than heretofore. Our future practices should be based upon established fact as far as is possible rather than chiefly upon opinion, which naturally is variable. In other words, there apparently is an increasing need for scientifically determining how to modify our present methods in order to have seventh, eighth, and ninth year boys learn most effectively and economically.

[12]The Committee appointed to collect these successfully tried units was made up of L. A. Herr, G. H. Hargitt, and A. H. Edgerton, Chairman.

(To be continued)

Boxes and Baskets

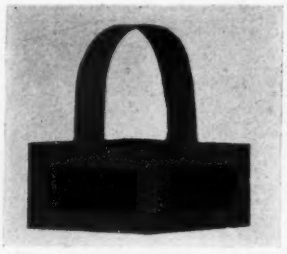
Miss S. E. E. Hammond, Springfield, Mass.

Basket No. 1.

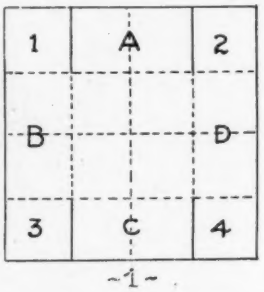
Material:

1 pc. green paper 6″x6″.
1 pc. green paper ¾″x9″.
4 pc. red paper ¾″x2″.

Fold green paper 6″x6″ into 16 squares. To do this lay the paper on desk with edges parallel with edges of desk. Fold top edge to bottom edge. Unfold. Fold top edge to fold. Turn paper half way round. The folded edge is now at bottom of paper. Unfold. Fold top edge to fold. Unfold. Turn paper one quarter way round. Repeat folding to form three other folds perpendicular to first three folds.



BASKET No. 1.



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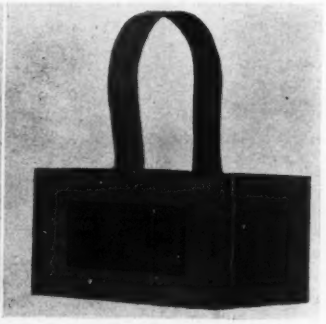
Cut as shown in Illus. 1. Dash lines indicate folds, drawn lines indicate parts to be cut. Paste red paper ¾″x2″ on oblong A. Repeat with other red papers on oblongs B, C, and D. Paste squares 1 and 2 on oblong A. Paste squares 3 and 4 on oblong C. Paste green paper ¾″x9″ on inside of basket for handle placing ¾″ end at bottom of basket.

Basket No. 2.

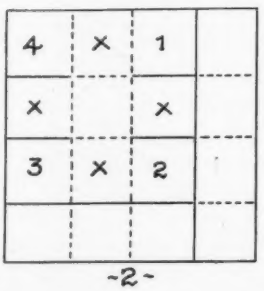
Material:

1 pc. red paper 9″x9″.
1 pc. red paper ½″x9″.
1 pc. red paper ¾″x3″.
1 pc. dark green paper 1″x4″.



BASKET No. 2. BASKET No. 3.

Fold red paper 9″x9″ into 16 squares. For directions see basket No. 1. Cut paper as shown in Illus.2. Dash lines indicate folds, drawn lines indicate parts to be cut. Fold dark green paper 1″x4″ on short diameter. Keep folded, fold again. Paper is now 1″x1″. Cut



-2-

-2A-

irregular form by cutting off corners. Illus. 2a. In like manner fold and cut red paper ¾″x3″. Paste four red papers on four green papers. Paste these on squares marked X. Illus. 2. Paste square 1 to square

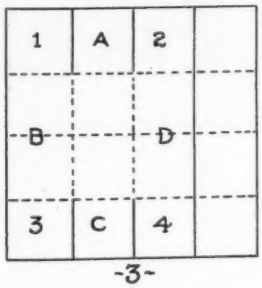
2 and square 3 to square 4. Illus. 2. Paste red paper ½"x9" on outside of these two squares to form handle. Paste two decorated squares to two sides of basket.

Basket No. 3.

Material:

1 pc. gray paper 9"x9".
1 pc. gray paper ¾"x9".

Fold gray paper 9"x9" into 16 squares. Cut as shown in Illus. 3. Using colored crayons place designs



-3-

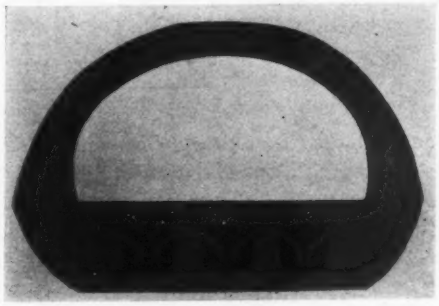
on surfaces A, B, C, and D. Paste square 1 on square 2. Repeat with squares 3 and 4. Paste end squares A and C. Paste gray paper ¾"x9" to inside of long sides of basket for handle.

Basket No. 4.

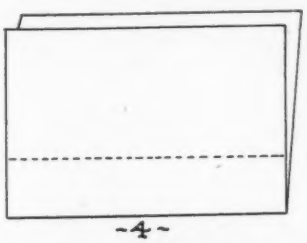
Material:

1 pc. colored paper 9"x12".

Fold colored paper 9"x12" on short diameter. Keep folded, fold folded edge over about 2". Unfold



BASKET No. 4.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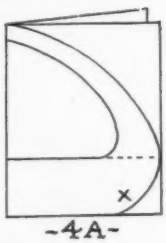


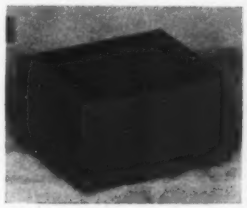
-4A-

last fold. Illus. 4. Fold on short diameter. Paper is now 4½"x6". Cut as shown in Illus. 4a. Unfold to basket shape. Paste edges marked X. Apply suitable decorations using crayon or cut paper units. Basket may be filled with free-hand cuttings of fruits and vegetables, sprays of Christmas greens, or spring flowers.

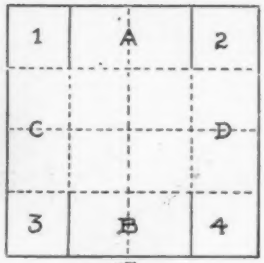
No. 5—A Box.

Material:

1 pc. colored paper 6"x6" (cover).
1 pc. colored paper 5¾"x5¾" (box).



BOX, No. 5.



-5-

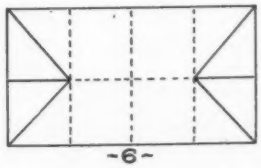
Fold colored paper 5¾"x5¾" in 16 squares. Cut as shown in Illus. 5. Crease folds well. Paste squares 1 and 2 on oblong A. Paste squares 3 and 4 on oblong B. Fold and cut colored paper 6"x6" as shown in Illus. 5. Apply decoration to four center squares which form top of cover, or to four oblongs A, B, C, D, which form sides of cover. Use crayon or cut paper designs. Paste cover same as box.

No. 6—Basket.

Material:

1 pc. green paper 4"x8" or 6"x12".
2 pc. red paper 1¼"x2¼".
1 pc. red cord 30".

Fold green paper 4"x8" or 6"x12" on long diameter. Unfold, fold on short diameter. Unfold, fold on short edge to short diameter fold. Unfold. Repeat with op-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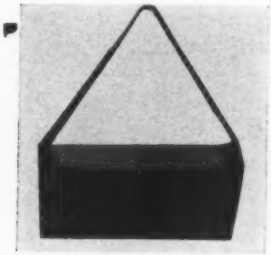
-6A-



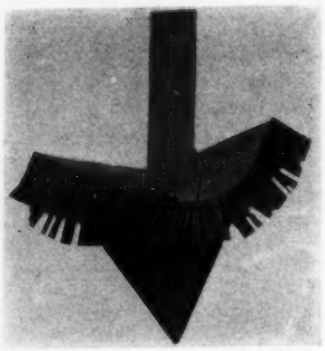
BASKET, No. 6.

posite short edge. Paper is now divided into eight squares. Cut as indicated in Illus. 6. First cut ends of long diameter, then fold and cut diagonals of squares. From one piece red paper 1¼"x2¼" cut tree and box. Illus. 6a. Using this as a pattern cut tree from second red paper. Paste two trees on sides of basket. Place end triangles one over the other with diagonal edges to folds, punch two holes in each end of basket, thread in cord and tie. Handle is double cord. Cut off extending ends of triangles.

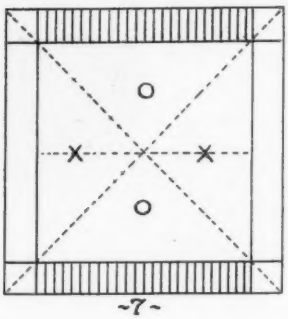
No. 7—Fringed Triangular Basket.

Material:

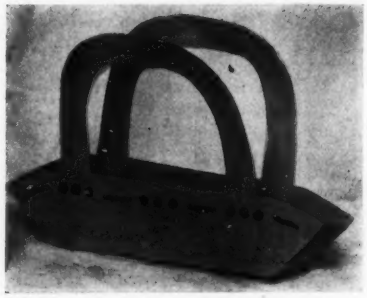
1 pc. light green paper 9"x9".
1 paper fastener.



BASKET, No. 7.



-7-



BASKET, No. 8.

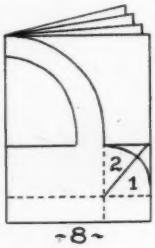
Fold light green paper 9″x9″ on one diagonal, unfold. Fold other diagonal. Draw 9″ line 1″ from and parallel to one 9″ edge. Repeat for other three 9″ edges. Cut off one oblong 1″x9″. Illus. 7. Cut off opposite oblong 1″x9″. Using colored crayon color any bright color two remaining oblongs 1″x9″. Fold paper on short diameter with colored oblongs on inside. Fold colored oblongs to outside, slash each oblong in fine and even slashes, cutting to the fold. Fold two triangles marked X inside triangles O. Fold one cut off strip 1″x9″ on short diameter. Lap two folded inside triangles and fasten to them with paper fastener folded strip 1″x9″ for handle.

No. 8—Oblong Basket.

Material:

1 pc. light colored paper 9″x12″.

Fold paper 9″x12″ on short diameter. Keep folded and fold over folded edge about ¾″ to form oblong ¾″x9″. Unfold last fold. Paper is now 6″x9″. Fold on short diameter. Paper is now 4½″x6″. Cut paper



-8-

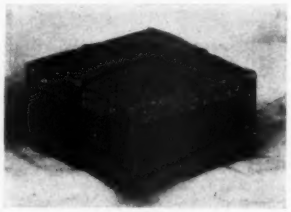
as indicated in illus. 8. Cut open edges first beginning horizontal cut about 2½″ from lower fold of paper, then cut upper edge of basket. Now cut inside of handle. Care should be taken to keep upper edge of basket 2½″ from folded edge and width of handle even. Cut diagonal. Round corners of basket as indicated. Unfold basket, crease well folds at bottom of basket. Decorate sides and ends using crayons or cut paper units. Paste parts corresponding to 1 inside parts corresponding to 2. Illus. 8.

No. 9—Popcorn Box.

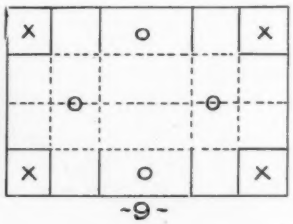
Material:

1 pc. dark green paper 6″x9″.
4 pcs. red or white paper ¾″x2½″.
1 pc. red or white cord or yarn 26″.

Mark off 9″ edge of dark green paper 6″x9″ into three 3″ lengths. Repeat on opposite 9″ edge. Draw 6″ lines connecting opposite points on 9″ edges. Illus. 9. Fold paper on these lines. Fold one 6″ edge to near 6″ fold. Unfold. Repeat with opposite 6″ edge. Fold paper on long diameter. Unfold. Fold one 12″ edge to middle 12″ fold. Unfold. Repeat with opposite 12″ edge. The paper is now divided with eight squares on each end



BOX, No. 9.



-9-

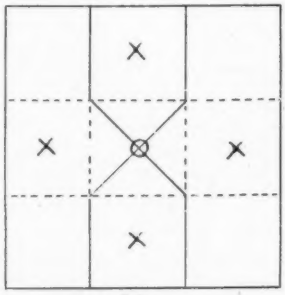
and four oblongs in middle. Cut out four corner squares marked X. Finish cutting as shown in Illus. 9. Paste oblongs of red or white paper ¾″x2½″ on oblongs marked O. Paste box. When filled close side oblongs for cover and tie with red or white cord or yarn.

No. 10—Twine Holder.

Material:

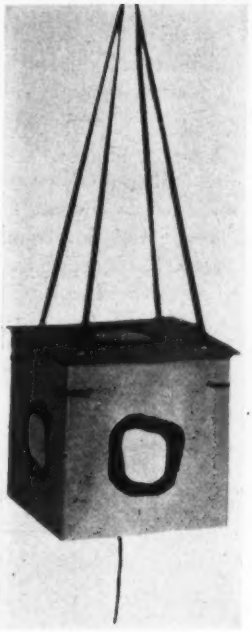
1 pc. light weight tag board 9″x9″ (box).
1 pc. light weight tag board 3¼″x3¼″ (cover).
1 ball twine.

Mark off one 9″ edge of tag board 9″x9″ in three 3″ lengths. Repeat on opposite side. Draw lines connect-



-10-

ing opposite marks. Repeat with two other edges. Draw two diagonals of center square. With large needle punch hole in center of center square. Cut as shown in Illus. 10. Fold on all lines but diagonals. To do



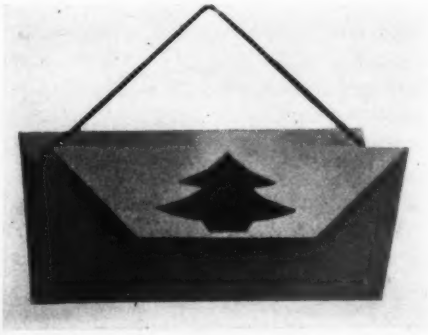
BOX, No. 10.

this place thin edge of ruler to line and fold tag board over ruler. Crease all folds again without ruler to insure good edges of box. Decorate outside of squares marked X using crayons, cut paper, or stick printing. Tag board 3¼″x3¼″ may also be decorated. Cut from twine ball four pieces cord 20″ long. Fold box, sides may be pasted or not as desired, punch small holes as shown in picture. Thread cord in side corners of box. Thread end of ball cord in center hole at bottom of box. Place ball in box. Thread corner cords through holes of cover, tie ends together, adjust cover.

No. 11—Basket.

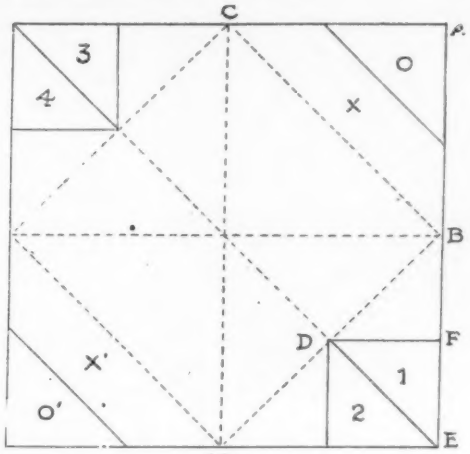
Material:

1 pc. green paper 9″x9″.
2 pcs. red paper 1¼″x2¼″.
1 pc. red cord 30″.



BASKET, No. 11.

Fold green paper 9″x9″ as indicated in Illus. 11. Care should be used in placing point A at middle point of fold BC, also in folding opposite triangle. Cut off triangles marked O and O′. Cut fold DE. Repeat at opposite end of diagonal. Fold edge DE to fold DB, unfold, cut DF cutting off triangle 1. Repeat folding



-11-

-11A-

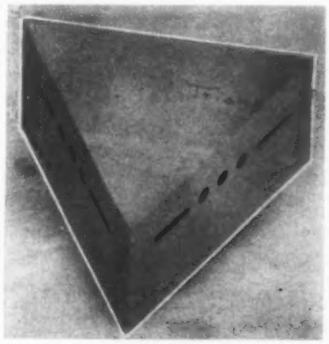
and cutting for triangles 2, 3, and 4. From red paper 1¼″x2¼″ cut tree and box. Illus. 11a. Using this as pattern cut tree and box from second red paper. Paste trees on parts marked X and X′. Place end triangles one over the other with edges close to folds. Punch two holes in each end of basket. Thread in cord and tie ends. Handle of basket in double cord.

No. 12—Triangular Box.

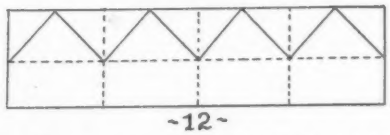
Material:

1 pc. light green paper 3″x12″.

Fold light green paper 3″x12″ on long diameter. Unfold, fold on short diameter. Unfold, fold one 3″ edge to short diameter. Unfold. Repeat with opposite

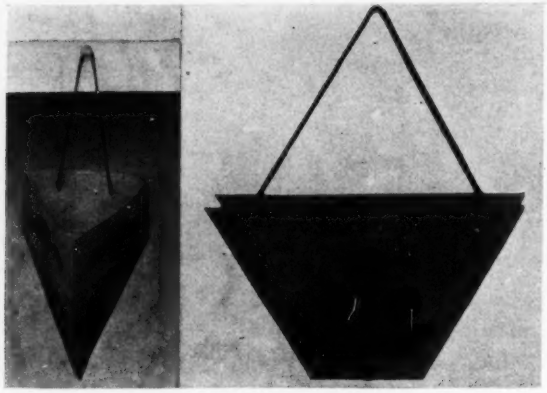


BOX, No. 12.



-12-

3″ edge. Paper is now divided into eight oblongs 1½″x3″. On one 12″ edge mark the middle point of one 3″ edge of each of four oblongs. Illus. 12. Draw lines from these points to corners on opposite side of each oblong. Cut on these lines. Decorate three oblongs 1½″x3″ using crayons, cut paper or stick printing. Apply paste to undecorated oblong, fold box by lapping triangles for base and placing undecorated end oblong 1½″x3″ inside decorated oblong, paste. Apply paste to point of outside triangle, paste. Repeat with triangle in box.



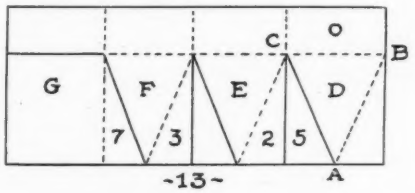
BASKETS, No. 13 and No. 14.

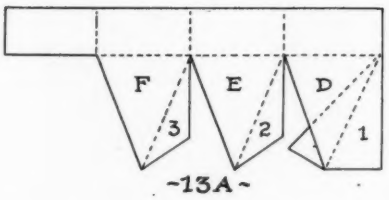
No. 13—Triangular Basket.

Material:

1 pc. light colored paper 5″x12″.
1 pc. cord 18″.

On the light colored paper 5″x12″ draw line 1½″ from and parallel to one 12″ edge. Fold on line. Unfold paper on short diameter. Unfold, fold 5″ edge to fold. Unfold. Repeat with opposite 5″ edge. Paper





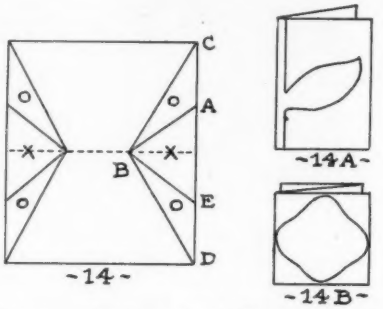
is now divided into four 1½″x3″ oblongs and four 3″x3½″ oblongs. On 12″ edge mark middle point of edge of three 3″x3½″ oblongs. Illus. 13. Place ruler to points A and B. Fold triangle 1 to edge of ruler. Crease well. Place ruler to points A and C, draw line. Cut out triangle 5. Repeat to form triangles E and F. When cutting off triangle 7 also cut off oblong B. Fold triangle 1 back on large triangle. Illus. 13a. Cut off extending part. Repeat with triangles 2 and 3. Decorate band or band and triangles with crayon, cut paper, or stick printing. Paste triangle 2 on triangle D, triangle 3 on triangle E, and triangle 1 on triangle F. Paste undecorated oblong 1½″x3″ inside decorated end oblong. Punch two holes through two pasted oblongs 1½″x3″. Thread in cord, tie ends.

No. 14—Flower Basket

Material:

1 pc. gray paper 6″x7″.
2 pcs. green paper 2″x3″ (stem and leaves).
2 pcs. dark colored paper 1″x3″ (flowers).
2 pcs. light colored paper ½″x1½″ (flower centers).
1 pc. cord 26″.

Fold paper 6″x7″ on short diameter. Unfold, mark middle of fold, place dot on fold 1″ from middle mark on fold. Illus. 1. Repeat on opposite side of middle mark. Place dot on 7″ edge 2″ from corner. Repeat from opposite corner on 7″ edge. Illus. 14. Connect points A-B-C by lines. Repeat measures and lines from opposite end of 7″ edge. Repeat measures and lines on opposite 7″ side. Cut out triangles marked "X". Place ruler to line, fold triangle to edge of ruler. Repeat for other three triangles. Crease folds well.



Fold paper 2″x3″ on short diameter, cut stem and leaves. Illus. 14a. Fold paper 1″x3″ in three parts. Paper is now 1″ square. Cut irregular circle. Illus. 14b. Fold paper ½″x1½″ in three parts. Paper now ½″ square. Cut irregular circle. The decorations for opposite side of basket may be traced from these free-hand cuttings and cut out. Paste on basket as shown in picture. Fold basket, punch holes. Illus. 14. Thread in cord, tie ends at top.

No. 15—Baskets A-B-C.

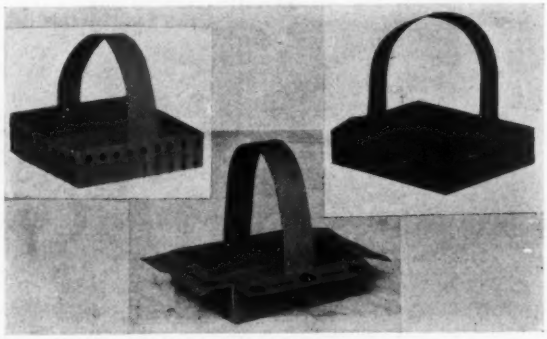
Material:

1 pc. colored paper 9″x9″.
1 pc. colored paper 1″x10″ or 1″x12″.

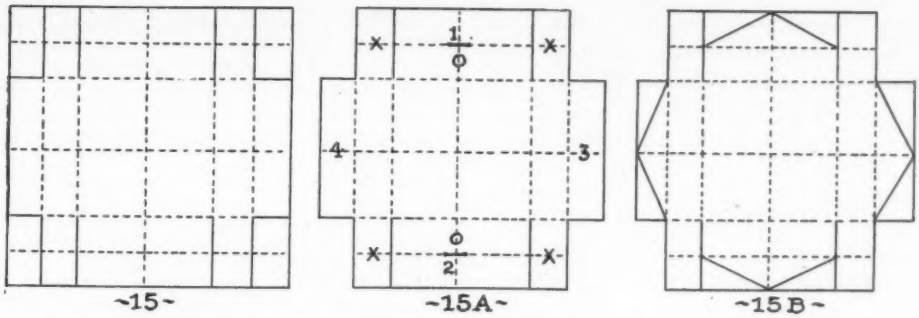
Fold and cut colored paper 9″x9″ as indicated in Illus. 15. Using crayon, cut paper, or stick printing decorate oblongs 1-2-3-4. Illus. 2. Cut 1″ slits. See 1 and 2. Illus. 15a. Paste oblongs X to outside of oblongs O. Slip ends of handle, 1″x10″, through slits and paste to outside of oblongs.

By folding down oblongs 1-2-3-4 and applying a little paste at each end you have basket B.

Basket C is made by cutting oblongs 1-2-3-4 as shown in Illus. 15b.



VARIATIONS OF BASKET No. 15.



The pictures, drawings, and directions for the four following objects will be found in my pamphlet *Pasteless Paper Construction.*

1. Plate 6, p. 24, Directions for folding unit.
2. Sachet.
3. Bird Book.
4. Double Picture Mount.
5. Single Picture Mount.

Establishing an Automotive Course

(Part One)

Everett G. Glenn, South High School, Minneapolis

MOST everyone knows that the automotive industries have had the most phenomenal growth yet recorded. In 1910 there were approximately 800,000 motor cars and during 1920 there were 8,932,458 motor vehicles registered in the United States. This means one motor car for every 11.48 persons, and represents a growth of approximately 1000 per cent in ten years. The total license fees from these cars was $98,000,000, 92 per cent of which is devoted to highway work and eight per cent to administrative work. When we consider the amount of labor it requires to build, operate, and repair these motor vehicles we wonder what would become of those so employed were it not for the automobile.

The average locomotive is composed of about 500 parts, while the modern motor car consists of approximately 3,500 parts. Before a man is given charge of a locomotive he must have spent several years, in study of it, as a hostler and as a fireman. Anyone may buy a car and after a few hours training be put in charge of it. His ignorance of that particular machine is bound to cost him excessive upkeep charges and grief.

Most automobile manufacturers find it necessary to run their own schools in spite of the fact that they may be the largest taxpayers in their cities and furnish more employment to the graduates of the public schools than any other single industry. The automobile is not confined to the large manufacturing centers but it is scattered quite evenly over the country, the south being somewhat behind the north in the number of cars per capita. The demand for training in automotive work has been so great that private schools have sprung up in almost every city. These schools charge as much as $500 for a course of study lasting a few months and they are nearly always filled with students. Besides the tuition they have the free labor of the students and operate as a garage, charging standard prices for the work turned out.

These facts seem to indicate that a course in automotive work in our public high schools would not come amiss and would be even more valuable as general knowledge and trade training than some of the work we now have.

Suppose that we have decided to install such a course in a high school enrolling between 1000 and 2000 students. We would find a demand for automotive training coming from three different sources.

First. The high school boy would demand it as part of his general training or possibly he would want it also for its immediate benefit in helping him to care for and to repair his father's car. He is hardly fitting himself for any trade but rather is getting a general education which he knows will help him along in the world, or he is preparing himself for college. In his case the work would take the form of pre-vocational training. This does not mean that he is taught anything but what is practical, since there is as much educational value in teaching practical things as there is in teaching any other.

Second. There would be a demand from car owners and prospective car owners for an evening school course which would teach them how to operate, care for, and repair their cars. Such courses are always popular and like the above should take the form of pre-vocational training. They are the regular high school courses abbreviated.

Third. There is in every city a large number of boys between the ages of 15 and 21 who have dropped out of school. The majority of these have quit because they have become tired of school and want to go to work. Distance lends color to almost everything and when they

were in school they longed to carry a dinner pail. But after getting about a year's taste of labor they have given up their jobs and are just drifting. There is plenty of equipment that can be used, while the regular student is not using it, to teach these boys the trade. They should be in school, if possible, six to eight hours per day. However, it may be that they have jobs which will allow them only four hours per day.

The demand for trade training will best be met by unit courses, such as vulcanizing, garage or auto mechanics, battery work, oxy-acetylene welding, and automotive electricity. Some say that a trade cannot be taught successfully in a school but if it is taught on a commercial basis with commercial equipment it will be a success. Trade training cannot be taught to either the high school student or the evening school student because there is not time enough nor sufficient equipment.

Pre-vocational training in automotive work consists of teaching the student the operation, care, and proper methods of repair but does not teach him skill and speed. Trade training includes skill and speed. The aim in trade training is to turn out a skillful operator, one who can go from the school to the shop and execute a properly finished piece of work in about the same time that the average tradesman requires to do it.

Unit Courses in Vulcanizing.

Six hours per day, five days per week, for ten weeks, with a two weeks' finishing course in a good shop, will make an average tradesman in vulcanizing work. The idea in giving a two weeks' finishing course in a shop is to thoroughly acquaint him with shop conditions and to remove any strangeness he may have upon entering a shop as a repair man. Any company will be glad to get his services gratis for two weeks. It is best to arrange this cooperation with quite a number of shops so that no one shop is over crowded. Upon completion of this course the student should know how to test, vulcanize, fix the price, and label tubes. He should know how to judge tires, determine the best repair to make and estimate its cost, how to make sectional repairs according to the Goodyear system, how to repair rimcuts, sandblisters, cuts in the tread, and breaks on the inside fabric. He should also know a tagging system and how to store tires, how to meet people and sell tires and tire accessories, how to lay out a vulcanizing shop and route the work, and also how to give real tire service in general.

Vulcanizing, as a trade subject, is very nearly ideal. It does not require extensive training; there will be very little material wasted; the cost of permanent equipment is small; and when the average fellow finishes the course there is a position ready for him at good wages. Besides this, it is a nice source of profit for the whole automotive department.

Cost of Permanent Equipment for Vulcanizing.
Twelve Students.

1 Craft Five-cavity Vulcanizer complete with the following:
9 pairs semi-steel bead moulds, 5 clincher, 3″, 3½″, 4″, 4½″, and 5″ and 4 straight side, 3½″, 4″, 4½″, and 5″.
1 24″ tube plate, 5″ wide.
1 3½″ inside vulcanizing arm.
1 inside core clamp.
— Two rows of adjustable screw clamps to adjust bead moulds.
4 Clamps for tube plate.
1 Gas regulator.

For gas steaming	$445.00
(For gasoline steaming add $39.00).	
(Shipping weight 1,300 lbs.)	
1 combination buffer and grinder	$ 28.50
1 3½″ third circle retreader as attachment for above machine	50.00
(This equipment can be purchased from the Minneapolis Iron Store Co.)	
1 Firestone air bag 3″x18″.	5.00
1 Firestone air bag 3½″x18″	5.50
1 Firestone air bag 4″x18″	6.00
1 Firestone air bag 4½″x18″	6.75
1 Firestone air bag 5″x18″	8.00
1 Success wire wheel brush	10.00
2 bench tire mandrels 3″	6.00
8 bench tire mandrels 4″	28.00
2 bench tire mandrels 5″	9.00
1 tube testing tank	2.00
1 tire pump of the single action type	2.50
4 tire spreaders	5.00
6 tube roughing brushes	3.60
Individual Hand Tools.	
12 square blade knives	3.60
12 fabric or step-off knives	6.00
12 pairs vulcanizer's shears	12.00
12 corrugated stitchers	12.00
12 fabric hooks, which can be made in the blacksmith shop	
Total cost of permanent equipment	$654.45
Installation	100.00
Total,	$754.45

Supplies.
Goodyear tire repair materials as follows:
25 lbs. G-105 black tread gum.
12 lbs. G-100 white tread gum.
25 lbs. G-170 cushion and tube gum.
5 lbs. G-180 quick cure gum for tube repair.
5 lbs. G-190 combination gum for tube repair.
25 lbs. HF-41 repair fabric.
5 gals. C-16 cement.
1 gal. C-25 quick cure cement.
6 Goodyear cord patches.
— reliners, and assortment.
— Valve patches.
— Valve cores and parts.

Battery Repair.

Practically all cars are equipped with storage batteries and, as the average life of a storage battery is less than two years, there is great demand for battery repairmen.

The unit trade course in battery work should teach the student skill in all of the following: testing a battery while in the car (by means of the lights and horn, with the hydrometer, with the voltmeter and high rate discharge test), how to charge batteries and make cadmium tests, tear down a battery, judge the plates and degree of sulphation, install new separators, burn on new plates or burn on a group, assemble and seal, burn on the straps, etc. Time for this course is six hours per day, five days per week, for ten weeks, with a two weeks' finishing course in a shop.

Cost of Equipment for Battery Repair Work.

Benches	$ 40.00
1 Hyrate cell tester	15.00
1 link cutter	5.00
1 U. S. lead burning torch from U. S. Welding Co.	25.00
1 set taper terminal reamers	4.00
1 battery plate press (Ambu)	37.50
2 pairs terminal tongs	5.00
6 hydrometers	4.00
2 plate burning racks	20.00
1 cadmium lead	3.00
Plumbing and gas-fitting	100.00
(Plumbing should consist of lead sink and lead pipes to sewer capable of draining sulphuric acid. There should be two gas plates, one Bunsen burner and one gas outlet for the lead as burning torch. City gas and oxygen make the best as well as the cheapest flame for lead burning.)	
Total cost of permanent equipment for battery repair work, including installation	$258.50

Automobile Mechanic's Course.

This course prepares the student for general garage work and is popular with most boys. However, the field is quite well filled and as a trade course it has less to recommend it than has any of the other courses listed here. It cannot be beaten as a pre-vocational subject for the high school student, because it involves so much in mechanics of all kinds.

The field covered by this course is too large to list all the important jobs a student should know how to do upon completion of it but a few will be given: he should know how to clean carbon, grind valves, adjust valves for clearance, take up bearings, adjust and repair the different types of clutches, adjust the common types of carburetors and repair them, set an ignition system to an engine, wire a car, test spark plugs, find firing order of a motor, assemble a differential and install a rear axle, align front wheels, tighten a steering gear, and repair a leaky radiator.

The equipment for this course can be bought at junk prices if the purchaser knows his business. In buying this equipment from automobile wrecking concerns care must be taken that they do not "palm off" some old special equipment which is illustrative of principles now discarded. If the equipment fills the following specifications one cannot go far wrong.

1 4 or 6 cylinder motor of the L-head type equipped with a high tension magneto	$ 50.00
1 4 or 6 cylinder motor of the L-head type equipped with a starting and lighting system and battery ignition	60.00
1 6 cylinder motor of the valve-in-head type equipped with battery ignition	60.00
2 engines and chassis complete with starting and lighting systems	200.00
1 Ford engine and chassis complete with starting and lighting system as used on the late Fords	100.00
1 Ford motor of the old type, 1918 or earlier	50.00
1 Borg and Beck clutch	20.00
1 multiple disc clutch	5.00
1 zone clutch	2.00
1 standard transmission	5.00
1 rear axle assembly of the full floating type	5.00

Cylinder blocks, pistons, crankshafts, and other parts can be picked from the junk pile. By going to an authorized Ford service station the following can be got from their junk pile for almost nothing: cylinder blocks, valves, enough parts to make a transmission, and enough parts to make a differential.

Ten carburetors should be obtained for $75. (Carburetors must be modern to be of any educational value. Refer to the statistical number of the Automotive Industries Magazine or of Motor Age for a list of all the cars made in the United States with their technical specifications. Select ten to fifteen of the most popular makes of carburetors. Write direct to the manufacturers of these carburetors, using your school stationery. Tell them about your work and ask for lowest prices for one or two for educational purposes and some of their literature). They will send you much valuable literature, some will send sectioned models, and in all cases very liberal discounts will be allowed.

Tools, including Walden or Blackhawk wrenches, open-end wrenches, valve grinders, thickness gauges, breast drills and regular twist drills of the smaller sizes, pliers, screwdrivers, hack saws, files, vises, etc., $100.00.

Each student who takes the course should be required to have an 8″ or 10″ Crescent adjustable end wrench, a good pair of combination pliers, and a 6″, 8″, or 10″, screwdriver.

The engines should be mounted so that they can be run. Individual gas tanks, exhaust pipes, and batteries are desirable. The exhaust gases present the greatest difficulty in installation. They must be piped to a proper outlet with little chance for escape, as with student operation of an engine there is danger of carbon monoxide gas poisoning. The exhaust pipe of the engine should be fastened with pipe fittings and a foot of flexible tubing to the pipe which conducts the exhaust outdoors. A 6″ to 10″ pipe laid in the concrete of the floor and having an exhaust fan at its opening makes a good device for getting rid of the exhaust gases. A drain should be placed under the engines and also water outlets for cooling. These outlets should be equipped with fawcets having hose connections.

Cost of installation as here outlined	$ 150.00
Entire cost of equipment installed	882.00
If actual car repair is contemplated add	1000.00

The automobile mechanics course does not lend itself so readily to commercial work as do the other unit courses herewith outlined. Before a student is allowed to touch a car he should be entirely familiar with all of the equipment herewith listed. He should have had his lectures and laboratory course completed, then, if there is the time, room, equipment, and cars to work on he may be allowed to work on them with very careful, individual supervision.

Many schools have tried installing an automotive course by putting "green" students to work on cars. There is very little educational value in this, because the jobs are so vastly different that it is hard to organize the work and the result is a wrecked car with its owner an enemy instead of a friend, a disinterested stu-

dent, and a worried instructor. Much better is it to have equipment as above listed and, by means of a laboratory course consisting of various operations common to the repair of a car, teach him in a systematic manner how to make repairs. In this way his mistakes are not costly and his education is better.

Unit Course in Automotive Electricity.

Certainly a pre-requisite for this course should be a high school course in physics which includes elementary electricity. The high school student who has completed a course in physics should not be put into the same class in automotive electricity with those who have not had such a course. This course has proven itself quite popular and of good educational value to the high school senior who is taking or has had his physics. Many of these are especially interested in electricity and to them this is valuable work.

Some technical high schools which have both electrical and automotive departments have this work taught in the electrical department by the regular electrical instructors. In as much as automotive electricity is a very special branch of electricity and furthermore that it cannot be separated from the gas engine work it seems to the writer that it certainly should be taught only in the automotive department. I have talked with many good electricians and have yet to find one who will admit that he knows much about the electrical equipment of an automobile. There is little similarity between wiring a house or switchboard and wiring a car or locating trouble in its electrical system. Another objection to separating the work is that there is great danger of friction between the two departments.

This course, when taught as a trade course to high school graduates, can be taught in six hours per day, five days per week, for twelve weeks. If it is taught to those who have not had physics one should add four or five weeks to this time for a course in elementary electricity.

In this course about half the time should be spent in the lecture room and the other half in a well-equipped laboratory. Upon completion of this course the student should be able to locate all kinds of ignition, starting, and lighting troubles. He should be able to wire up any car, without the use of a diagram so that it will operate satisfactorily. He should also be taught how to wire a car according to a diagram. He must know and be familiar with all of the most popular makes and models of ignition, starting, and lighting units and how to repair them; how to test an armature, field coils, ignition coils and condensers; and how to overhaul a high tension magneto and set it to an engine. He should know the methods of current regulation in the common types of generators and how to rewind field coils. Rewinding armatures is quite difficult and is not necessary for him to know as it is more or less a special branch. There are, of course, many other things he should know but these are some of the most important ones.

(To be continued)

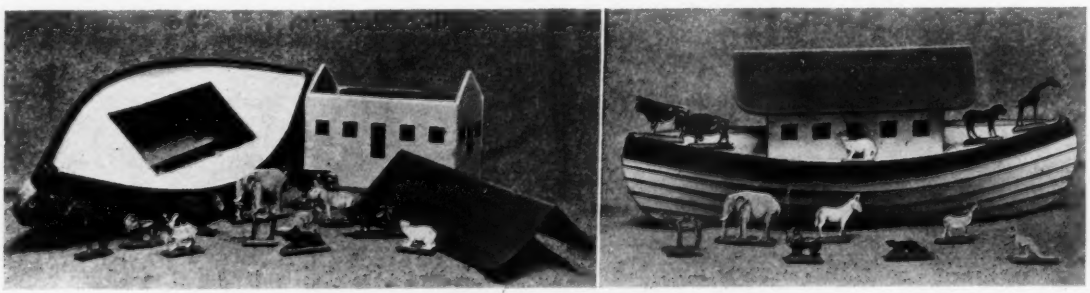
Noah's Ark and Animals

E. W. Tuttle, Director Practical Arts Department, E. Orange, N. J.

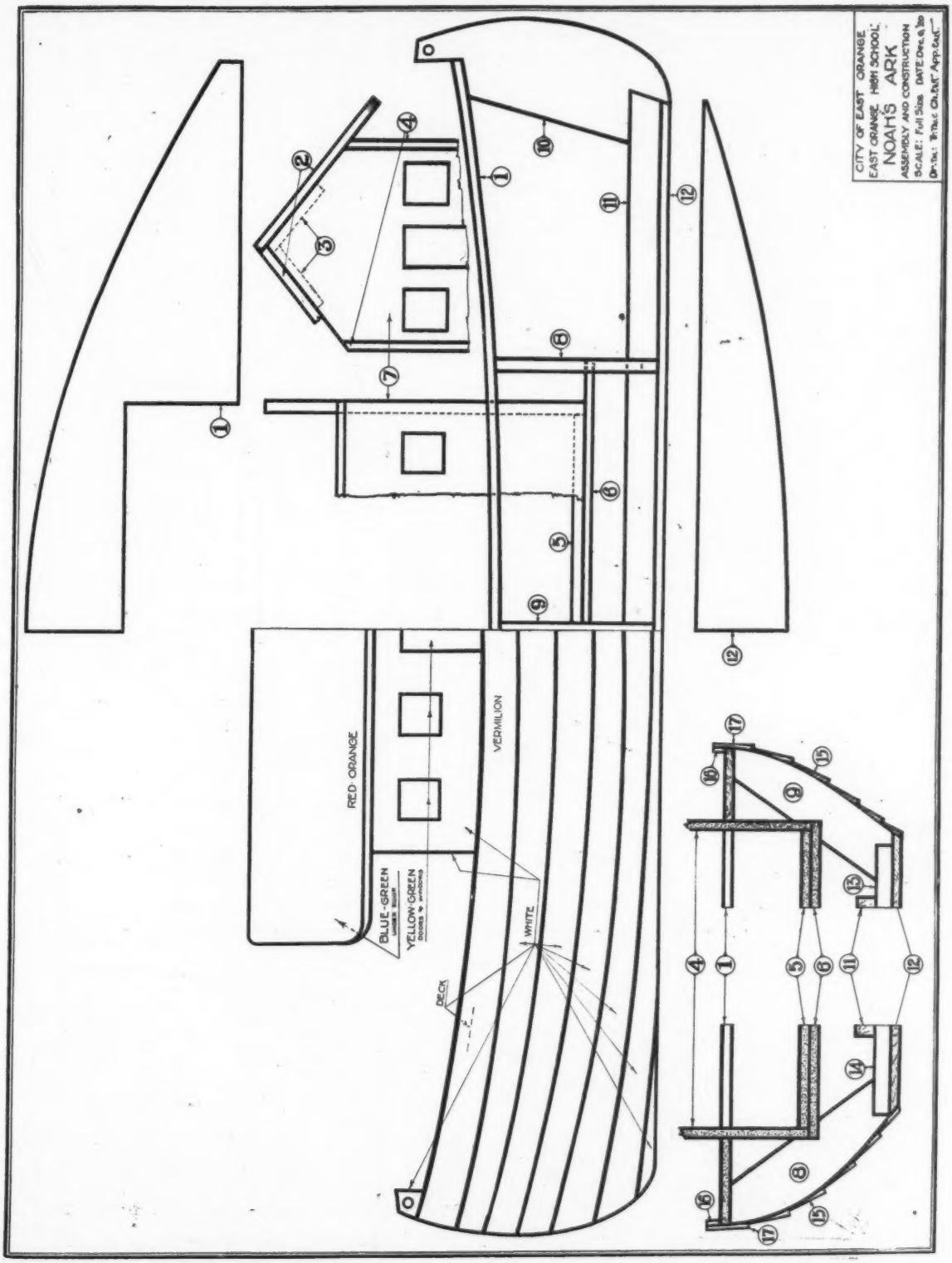
THE three prime factors that govern the choice of practical arts projects are generally accepted as being motivation, education, and economy. Economy, for the past three years, has been the watchword; but our energies and ambitions have by no means been restrained thereby.

The Noah's ark and animals problem offers an eighth grade project that well covers the three prime factors, especially the last, economy. The actual cost of the necessary supplies for this project barely reaches the dollar mark, while its market value exceeds the cost many times.

Little needs to be said of the animals, with the exception of reference to the material, which must be either three-ply basswood or its equivalent. Devoe show card colors are very convenient to handle and dry quickly. The drying quality is quite important on account of the necessity of storing the toys at the end of class periods. Tag board or tin templets have proven most successful. They help to bridge unnecessary difficulties and preserve interest, while increasing efficiency in production.

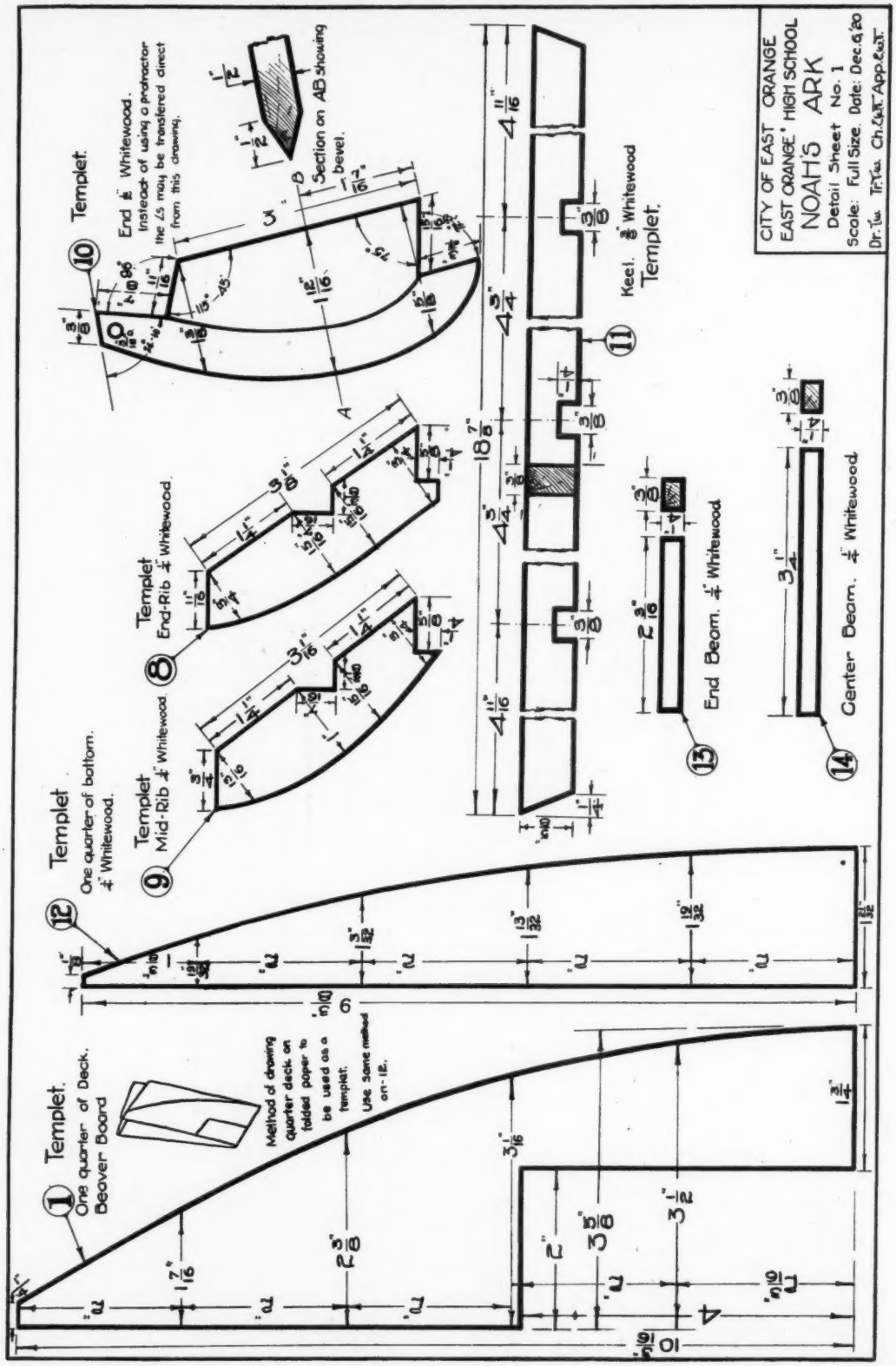


THE ARK READY FOR PLAY.



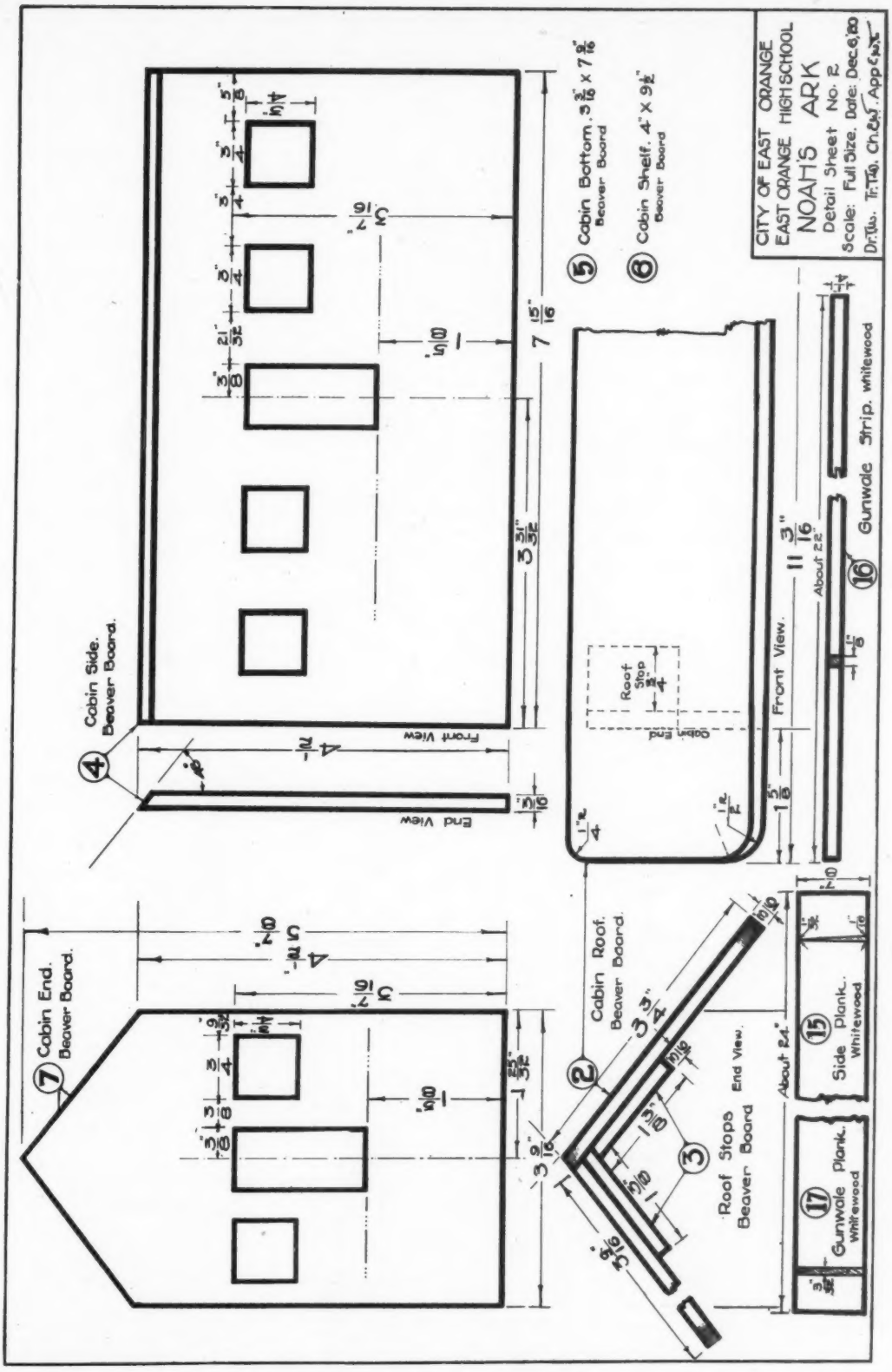
The sizes of the animals are not accurate when considered upon the basis of life comparisons. Convenience rather than mathematical nicety has here been sought. Sizes can be worked out to suit individual cases. The proportions given on detail sheet No. 3, while simply suggestive, have been worked out to a successful application.

The ark differs greatly from its historic original but seems to answer the purpose, in addition to offering

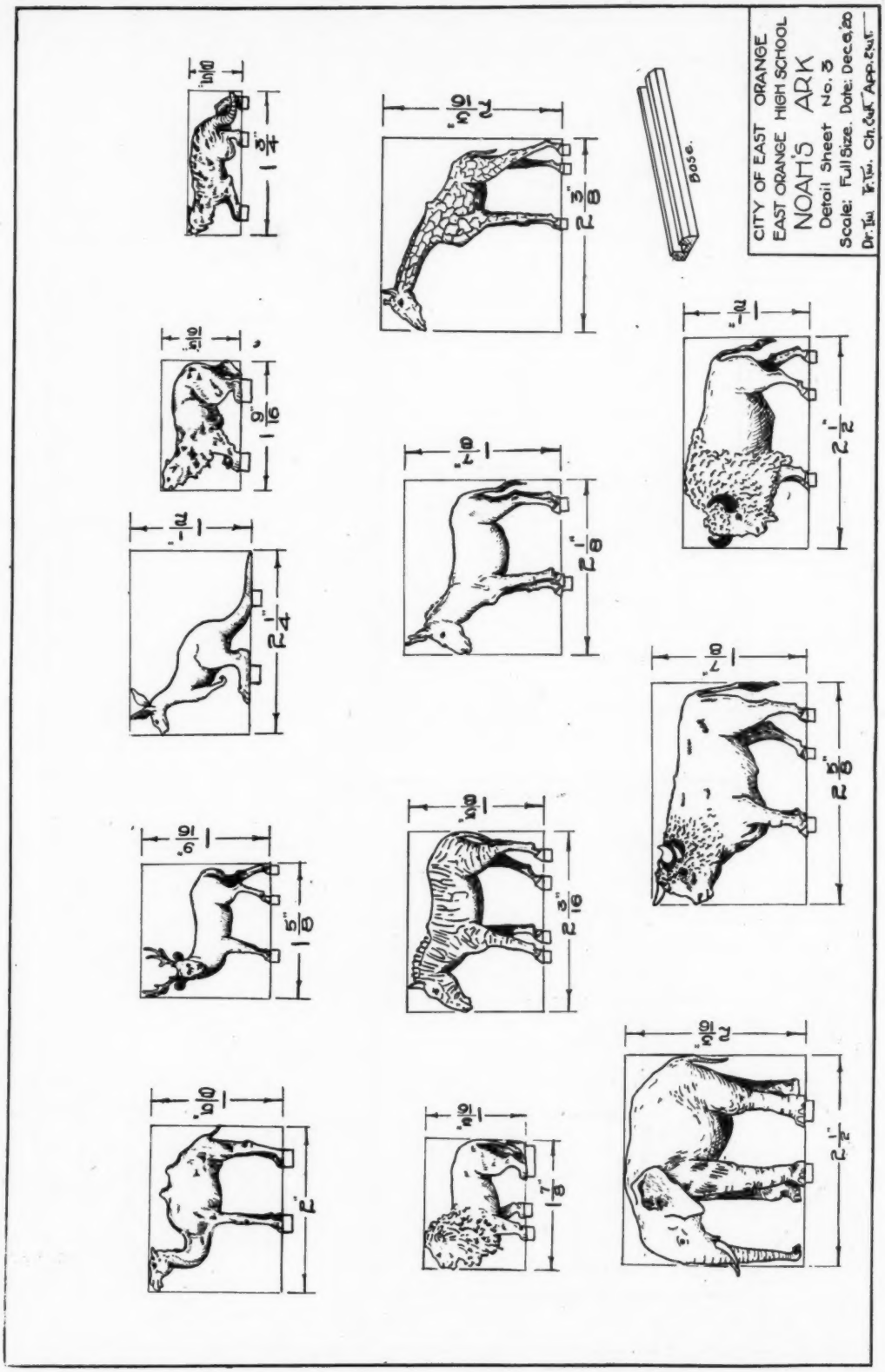

CITY OF EAST ORANGE
EAST ORANGE HIGH SCHOOL
NOAH'S ARK
Detail Sheet No. 1
Scale: Full Size. Date: Dec. 6, '20
Dr. Tw. Tr. Tw. Ch. & T. App. & T.
10 Templet.
End ½" Whitewood.
Instead of using a protractor the 45 may be transfered direct from this drawing.
Section on AB showing bevel.
11 Keel. ¾" Whitewood
Templet.
8 Templet
End-Rib ½" Whitewood
9 Templet
Mid-Rib ½" Whitewood
13 End Beam. ½" Whitewood
14 Center Beam. ½" Whitewood
12 Templet
One quarter of bottom.
½" Whitewood.
1 Templet.
One quarter of Deck.
Beaver Board
Method of drawing quarter deck on folded paper to be used as a templet. Use same method on ½".

splendid opportunities for experiment in amateur boat building.

In assembling the hull, it is well to use the following directions: When the keel has been laid, nail together the parts as follows: (a) Center beams, end beams, and ends; (b) Mid and end ribs; (c) Cabin shelf; (d) Deck; (e) Tack gunwhale plank lightly to mid rib, start laying the side planks working from the


CITY OF EAST ORANGE
EAST ORANGE HIGH SCHOOL
NOAH'S ARK
Detail Sheet No. 2
Scale: Full Size. Date: Dec. 6, 1920
Dr. Tu. Tr. Tag. Ch. Eng. App. Inst.
5 Cabin Bottom. 3 3/16 x 7 15/16 Beaver Board
6 Cabin Shelf. 4" x 9 1/2" Beaver Board
4 Cabin Side. Beaver Board.
Front View
End View
7 Cabin End. Beaver Board.
2 Cabin Roof. Beaver Board.
Roof Step
Cabin End
Front View.
About 22"
16 Gunwale Strip. whitewood
3 Roof Stops Beaver Board
End View.
About 24"
15 Side Plank. Whitewood
17 Gunwale Plank. Whitewood

top down; (f) Tack the side planks lightly to mid rib, leaving about 5/8" to the weather; (g) Tack the gunwale plank lightly to both ends; (h) Slip the thin edge of side plank under gunwale plank and tack lightly. The planks are cut long enough to extend over the ends about 1". When finished, the ends are trimmed off and


CITY OF EAST ORANGE
EAST ORANGE HIGH SCHOOL
NOAH'S ARK
Detail Sheet No. 3
Scale: Full Size. Date: Dec. 6, 20
Dr. Ju. Tr. Ju. Ch. Cut. App. Cut
Base.

sanded to good surfaces with the end beams. F. H. wire nails ½″ No. 18, ¾″ No. 19, and 1″ No. 20 are the necessary fastenings.

The hull, when finished, must be calked with white lead in order to fill any cracks in the planking. This will make it watertight and usable as a boat.

The cabin must be made accurate to dimensions in order that it may be easily removed from the hole in the deck. This makes a two-fold project. The cabin may be used as a house for the animals, and the hull, for a boat.

Two coats of paint and one coat of spar varnish will finish the hull to reasonable satisfaction.

The cabin and animals may be finished with flat paint and shellaced, or they may be painted with a good quality of enamel.

The windows and doors on the cabin are marked out with a stencil and finished freehand with the small brush used in painting the animals.

The sawing out of the planking is a machine process and, unless access to a power saw is possible, the project should not be attempted. In other respects, the construction is suitable for any elementary shop.

Topics for study and class discussion:

Geography, history, nature study, and commercial values of the various animals.

Manufacture, general uses, and cost of Beaver Board.

Review "from stump to market" of white wood, its identification, general uses, and cost per board foot.

Geography, history, and manufacture of the wire nails.

History, chemistry, and manufacture of paints, varnishes, and shellacs.

Study and discuss the educational value of templets, jigs, and fixtures.

Safety First--Common Sense a Poor Second

Eward H. Crussell

THE following list of rules was culled some time ago from the pages of a well known magazine:

1. Never use a machine until you have secured permission from the instructor.
2. Never use a machine until you are conversant with the safety rules governing the operation of that machine.
3. If anything goes wrong, throw off the power immediately and report to the instructor.
4. Never leave a machine with the adjustments loose.
5. Do not talk to anyone working at a machine.
6. Never attempt to oil, repair, or set up a machine while it is running.
7. Never allow debris to accumulate around a machine.
8. Always use the guards.
9. Never wear a four-in-hand necktie and allow it to hang loose while working around a machine. Wear close fitting clothes. Be sure that the sleeves of your jacket are tightly buttoned or turned up at the elbows.
10. Never play pranks or scuffle with a fellow workman.
11. Never use a machine while the instructor is out of the room.
12. Never use a tool with burred edges.
13. Never wear jewelry on the hands while operating a machine or working with hot metal.
14. Never attempt to look about you while operating a machine. Attend strictly to business.
15. Never throw off a belt with your hand, use a stick.
16. Never use a file without a handle.
17. Never use the emery wheel without wearing goggles.
18. Never try to stop an emery wheel with your hand.
19. Never try to talk and work on a power machine at the same time. It is impossible to do two things at once and do them well.
20. Never throw a switch lever in or out too slowly.
21. Cultivate personal caution."

The magazine gave credit to the author of the rules and appended the following note: "These rules should be printed and distributed to every pupil in an industrial class where machinery is used and a large placard containing the rules should be hung in every such shop."

For reasons which will shortly appear, the present writer refrains from mentioning either the name of the magazine, or the name of the author of the rules. They are no better and not much worse than a lot of the same sort of piffle that has preceded them, and are used in this article as a "horrible example", to emphasize some of the more common mistakes made by those interested in the safety first movement and the propaganda pertaining to it.

We often find criticism classed under two heads, namely: destructive and constructive. This classification the present writer has always refused to recognize. Criticism, according to his understanding, is either true or false; true criticism is more often destructive than otherwise; destructive of things which are wrong, in order that things which are right may take their place. Things which are right cannot be hurt by criticism, false or otherwise. With this explanation, let us admit that this article is choke full of destructive criticism.

Superfluous Rules.

Let us first consider the note which was appended by the magazine. I wish to go upon record as saying that of all the fool ways of wasting time, money and materials, printing rules and distributing them to pupils is at the head of the list.

Perhaps you do not agree with me. Moreover, you may think the rules are very good, and you may agree with the editor who said they should be printed and distributed to pupils. Fine! Let us now reason together. You have just read the rules, how many of them can you repeat from memory? Four? Five? All of them? If you can, it is because you already knew them before you met them in this list. The rules in this list, which you had not met with or thought of before, would surely be the ones to which you would pay the most attention, and yet I think I am safe in saying that of these rules, if there were any, (and I sincerely hope there were) you do not remember one. And if you, with your

more particular interest in them do not remember them, why should you expect the pupil to remember them?

You say that you expect the pupil to read them more than once—to learn them by heart? Well let me say, when the time comes that pupils do all that they are expected to do, and are able to get their knowledge from printed instruction sheets, your job will be gone and so will mine, and teaching instead of being one of the most difficult of the arts will be as easy as feeding chickens. But until that time comes, a list of safety instructions in the pocket of the pupil at the lathe or circular saw, will be of no more use to him than a book on the art of self-defense would be to me were I so foolish as to get into an eighteen foot ring with the champion prize-fighter of the world.

In my experience in safety work, I have found only one thing equally stupid with distributing printed lists of instructions to the pupils, and that thing is: printing rules on a large placard and hanging them up in the shop. The only pupil, or we might better say the only person who will pay any attention to these posted rules, is the one who would observe the rules whether they were posted or not.

So much for the negative value of these posted rules and warnings, we come now, to what close observation has convinced me is a very positive evil in connection with them, and that is: Too many instructors stick to these warnings around their machines, and distribute them to their pupils in an endeavor to dodge their own just responsibilities. They seem to figure that once the warnings have been posted and distributed, they have done all that they can be expected to do for the prevention of accident, and if the pupil should now meet with a mishap it is entirely his own fault and he has nobody but himself to blame because he did not follow the rules. Instructors in the schools are not the only ones at fault in this matter either, those in the business world and in the industries are every bit as bad and, in many cases, much worse.

Proper Teaching vs. Printed Warnings.

I respectfully suggest that those of you who have been putting your trust in printed rules and warnings, pause right here long enough to let this indisputable fact sink in: *If the learner is properly taught, he has no need of printed warnings; if he is not properly taught, printed warnings are of no use to him.* And now, if you still believe in signs, get that printed in large type and paste it on the face of the classroom clock.

So much for the magazine's endorsement, let us now briefly examine the rules, taking them in numerical order:

Rule 1. This is a senseless and useless rule. If the instructor is doing his duty, pupils will no more think of using a machine without his permission, than they would think of helping themselves to the contents of his purse.

Rule 2. Thoroughly covered by rule 1.

Rule 3. This must be taught as a habit, not written out as a rule.

Rules 4, 5, 6, 7. Same as rule 3.

Rule 8. Grand! Took a smart brain to think of a rule like that; unfortunately, the guards cannot always be used.

Rule 9. Ask any boy's mother if you can teach him to keep his clothes in order by writing rules about it.

Rule 10. See rule 5.

Rule 11. See rule one.

Rule 12. A close observance of this rule would entirely do away with the use of the cabinet scraper. Wouldn't it?

Rule 13. Takes in too much territory. One cannot mix the safety precautions necessary for the operation of machinery with those necessary for the handling of hot metal and get good results.

Rule 14. See rules 10 and 5.

Rules 15. See rule 2.

Rule 16. O----h Hum! Didn't use a hammer without a handle either.

Rules 17 and 18. See rule 2.

Rule 19. See rules 5, 10, and 14.

Rules 20 and 21. Good advice, and worth just as much for safety precaution purposes as good advice usually is.

And now, having with our destructive criticism, cleared some of the debris out of the way, let us see if we can offer anything to put in its place.

Constructive Criticism.

Some few accidents are unavoidable, they occasionally happen to the most careful of workmen; the majority of accidents are, however, due to carelessness and lack of knowledge. The actual *teaching* of safety precautions in American Industry, is something which in the past has been almost entirely lacking. Of over one hundred mechanics (woodworkers, electricians, machinists, etc., in the writer's "Teacher training classes") who were asked the question: "What safety precautions in the handling of machinery were you taught as an apprentice?" only one, a patternmaker, had been told, shown, or taught, anything of the kind. This man, *after he had finished* beveling some material on a variety saw, had been told by another workman that it would have been safer to work with the ripping guide on the down-hill side of the saw.

The other students invariably stated that the only safety precautions they received were, "Keep away from the machine altogether", and that in order to learn how to use the machine, they had to steal their chances and work at it when no one in authority was around. I feel sure that, "Keep away from the machine altogether" phrase will awaken memories in the minds of everyone of my readers who spent his apprenticeship amongst machinery.

You get the idea of course; no one wished to take the responsibility of teaching the learner how to handle

the machine, so he was told to keep away from it, with the certain knowledge that he would seize every opportunity of using it, and thus learn its ways without anyone being held responsible. If an accident happened there was, of course, no one but himself to blame, because he had received strict instructions not to touch the machinery.

It is from something of a similar nature to the foregoing, that the need for such rules as number (1) and (2), arises in the classroom. If a pupil definitely understands that somewhere in the near future he will get his proper turn at the machine, under competent instruction, he is usually perfectly willing to await that time. If, on the other hand, his queries are continually met with evasive replies, and he sees no chance of ever gaining permission to use the machine; then he will take the first opportunity to use it without permission, and the most wonderful set of rules that were ever printed will not prevent him doing so. Anyone, who has himself been a boy, will understand the pupil's attitude in this matter, and no instructor should be permitted, through ignorance, laziness, indifference, or any other cause, to delegate his just responsibilities to a set of printed rules.

A Reduction of Accidents.

In the past, statistics have been brought forward to prove that this safety first propaganda, printed rules, signs, etc., have materially reduced industrial accidents over a given period. The answer to this is, that it is not the printed rules, but the actual safety appliances put into operation that have reduced the number of accidents. A reduction of accidents in the structural steel industry is due more to the spreading of safety nets than to the spreading of propaganda; and the elimination of square cutter heads, projecting set-screws, unguarded gears, open elevator shafts, etc., is a much more effective safety precaution than the printing of scarehead rules telling the workman to keep away from these dangers.

The difference between the two can be illustrated by means of the following anecdote. In the Winter of 1898, the writer, in company with a number of other unfortunates, was helping to re-build the Victoria bridge over the St. Lawrence river at Montreal. The job was a big one and accidents were plentiful. Men in row boats were stationed in the river beneath the bridge, whose business it was to pick up any of those who were so careless as to fall off.

This worked well enough for a time, but as the Winter went on, the ice began to float down from the lakes above and the foreman in charge met us one morning with a brand new safety rule. Properly expurgated for publication it ran something like this: "I just want to tell you fellows, that anybody who falls off the bridge today will lose his job; there's too much ice in the river for us to keep a boat down there". Of course he was right, too; anybody falling sixty feet and landing on a chunk of ice eight or ten inches thick would be likely to lose his job, but at the present day our friend the foreman, in addition to his safety rules would in all probability be required to sling a safety net beneath his workmen.

No sir. Safety precautions cannot be taught to the beginner by printing rules, neither can they be taught to, from five to five hundred workmen, young or old, by gathering them together into a room and forcing them to listen to a lecture on the subject. Nor is it possible to devise a set of general rules and instructions that will apply to all machines. Nor should the learner get his safety precautions one day (either as an individual or in a class or group) and do his work on the machine the day following. And most emphatically of all, under no condition should the learner be permitted to use the machine first and get the safety instruction pertaining to that machine afterward.

Safety Precautions Must Be Taught.

Each machine requires its own set of precautions. They should be taught by an instructor who is thoroughly conversant with the operation of that machine and the safety precautions needed in its use. No attempt should be made to teach all of the precautions needed for the operation of any machine in one lesson. The instructor should first analyze the work of the machine, and make a list of the operations that may be performed on it. He should then list all the precautions needed for any particular operation and teach them to the learner along with the operation the first time he is called to perform that particular operation on the machine. Not before, and not after, but at the time when he will see a need for it and can put it into practice. Make the safety precaution a part of the operation and teach it so thoroughly that it becomes a habit. Teach one operation at a time, and prove by a thorough test, that the learner has it correctly learned before proceeding to the next.

It is here assumed that the instructor has had charge of the learner from the beginning; in which case there is never any real difficulty in teaching safety precautions, the learner cheerfully accepting them as something inevitable. If, however the learner has previously done work on the machine, and without the safety precautions, then the proper teaching of them becomes almost an impossibility. Even though the learner tries to follow the new instructions, habit becomes too strong for him and he uses the risky method without meaning to do so.

In conclusion, it may be well to state, that it does no good for the instructor to teach safety precautions unless he practices what he teaches. The young of the human race learn a great deal by imitation, and if the instructor, instead of using a push stick, reaches over the circular saw to draw through the short stick he is ripping; or throws a belt off or on with his bare hands, there will be plenty of pupils anxious to show him that they are just as smart in this respect as he is.

So much for the present, I hope, with the Editor's permission, to go further into this matter of safety work with you in the near future.

FIG. 1. GENERAL VIEW OF THE APPARATUS.

Home-Made Playground Apparatus

Supt. R. W. Wagner, Webb, Ia.

SOME-MADE playground apparatus had been accepted as the right idea, and the manual training classes had made swings and teeter-totters. "What next?" Slides seemed to be the logical answer. A fruitless search was made for drawings or blueprints. There was nothing left to do but make designs. This was done. During the weeks of construction, that haunting question persisted: "Will they work when they are finished?" But since they have been erected and tried out, and have "worked," the project is described for the benefit of other believers in the home-made-playground-apparatus idea.

About the first problem to be solved was the selection of suitable material for the bottom of the slides. Wood was not considered on account of the trouble which was feared in getting suitable stock. Metal was decided on and finally galvanized iron was the one metal selected. It was easily obtained and was not excessively expensive. It is making good in actual use.

The mounting of the slides was partly provided for to begin with. The uprights of a large pair of swings (shown in Fig. 1), served as a beginning of the supporting structure. The general plan was to have two platforms, a high one and a lower one, the high one connected with a single long slide, and the low one connected with two short slides, or with one slide and a

FIG. 2. THE SLIDES.

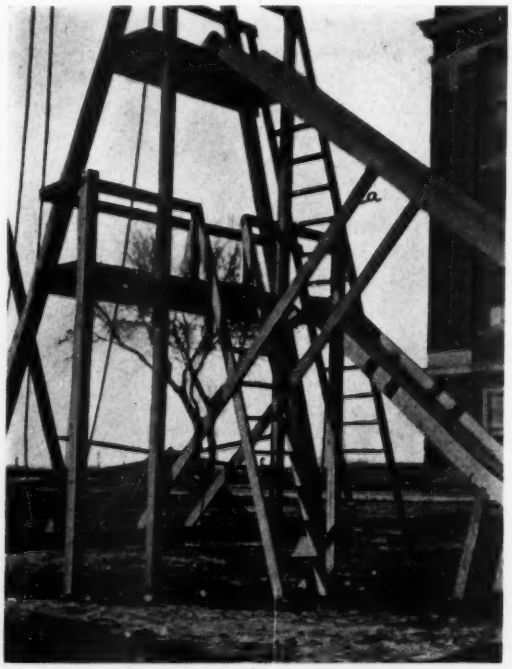
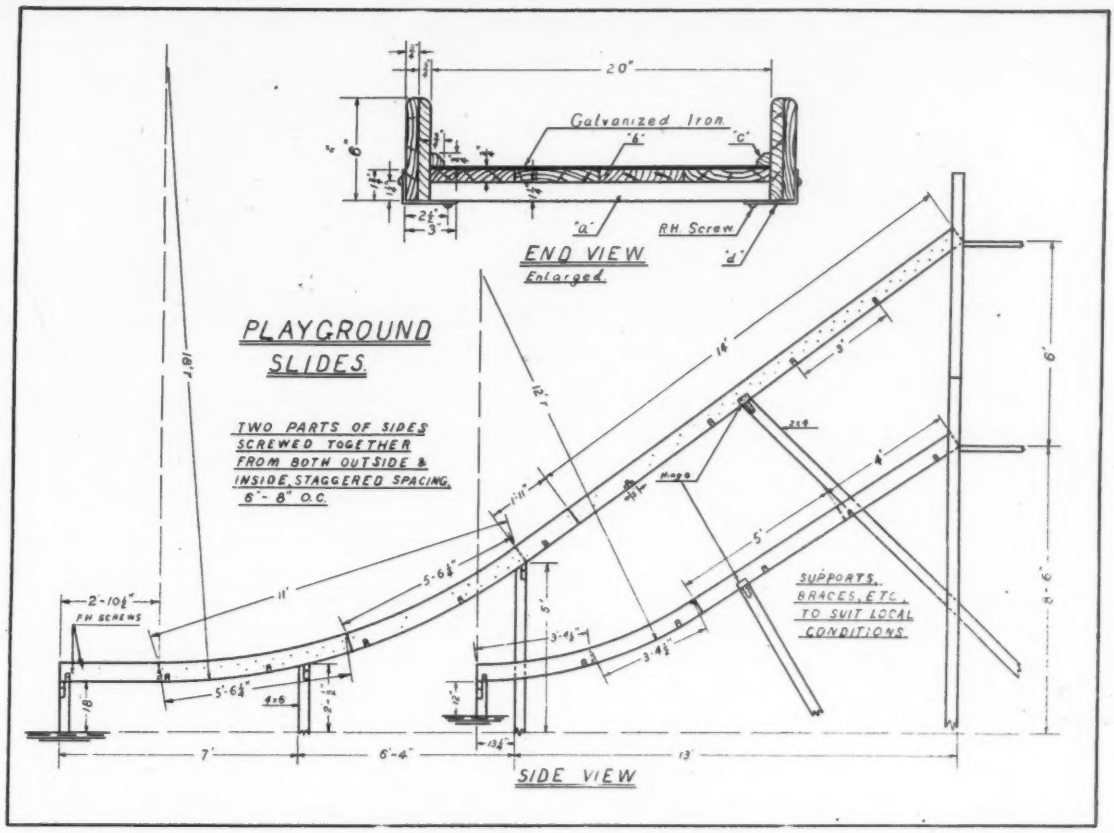


FIG. 3. DETAILS OF THE SLIDES.



DETAILS OF PLAYGROUND SLIDES.

pair of parallel sliding rods. To date, only one of the shorter units has been installed.

On one side, the platforms were supported by the two swing uprights as shown in Fig. 2. On the opposite side they were supported by four 4x4 posts. These posts were bolted to the platforms, their lower ends resting upon cement slabs buried in the ground. The two middle posts attached to both upper and lower platforms; the two outside ones to the lower platform only. These posts extended above the platforms sufficiently to serve as supports for hand railing.

The high platform is reached by a ladder to one side of the platforms as shown in Fig. 1. The ladder leading to the lower platform meets it at the middle. In this way the traffic toward the two ladders, in no way interferes. The long slide is directly above the ladder leading to the lower platform.

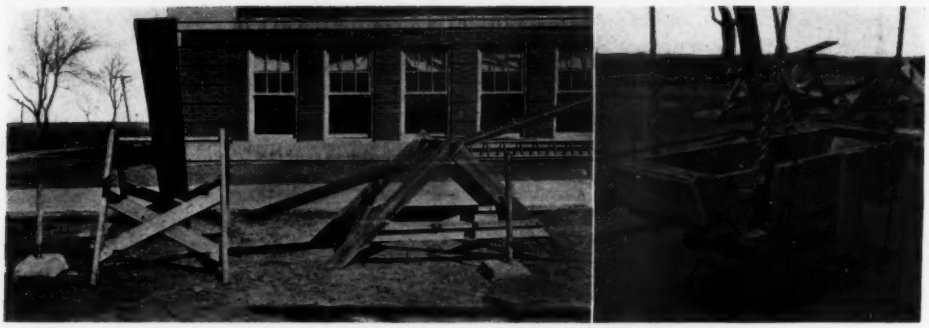
The slides proper, were constructed as shown in the drawing. The curved sections of the sides were first cut out. The first piece cut for each slide, served as a pattern for the other curved sections resulting in a saving of lumber. The parts composing each side were then screwed together, the screws being inserted from both sides and staggered. One side piece, assembled, was laid on the floor and the other side held in place above it, while the cross-pieces "a" were located and nailed in place. The assembly thus formed was then turned over and the remaining side piece, assembled, was nailed in place. The bottom strips "b" were then screwed in place. The galvanized iron was laid on over these and secured in place by the strips "c". It is necessary that the iron be secured by nails extending through "c" into the bottom boards.

In the large slide, the bottom boards were of ¾" stock. In the small slide, these were of ⅝" ceiling. The latter material is to be recommended as superior to the ¾" stock.

The angle irons shown at "d" were made in the local blacksmith shop from wagon box iron.

The galvanized iron was obtained in standard 8" lengths; four being used for the large slide, and two

FIG. 4. CONSTRUCTION OF THE SLIDES.



FIGS. 5 AND 6. THE TEETER-TOTTERS AND THE SWINGING CARRIAGE.

for the small one. The end of each piece overlapped the piece below it like shingles on a roof. The ends were left without any fastening.

The slides are attached to their platforms by pieces of flat iron 5/16″x1½″ bent to the proper angle, screwed up against the sides of the slides, and down upon the top of the platforms. The long slide is supported by two 2x4 braces shown in Fig. 3 at "a". These braces are bolted at their lower ends and attached at their upper ends by means of hinges as shown in Fig. 3 above "a". The smaller ladder fits inside these two braces, the two units thus rendering mutual support. The three 4x6 posts shown in Fig. 2 "a" support the lower end of the large slide. They stand in cement and extend 3″ below the surface. At the top of each post is a 2x6 cross piece supporting the sides of the slide and attached to them by strap iron. The small slide has but two short braces as shown in Figs. 2 and 3. Its lower end rests on a piece of 4x6. See Fig. 1.

The drawing gives the slope of the slide as installed. By tilting the slide, builders may increase or decrease the slope to give greater or less speed as desired. Careful observation of the slide in use, leads the writer to recommend the indicated slope as about ideal.

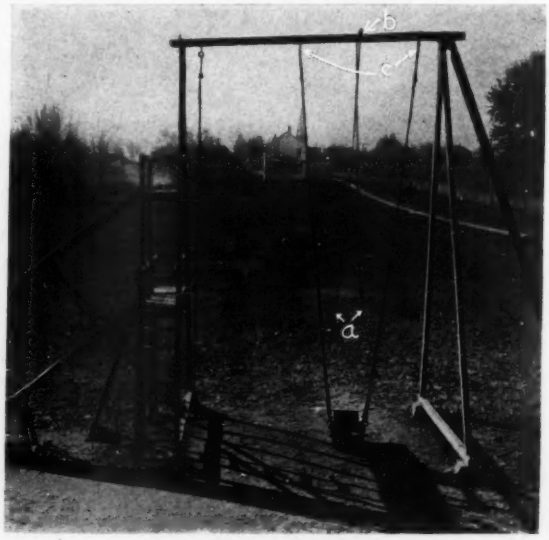
A word should be said in regard to the teeters mentioned in the first paragraph. The posts at "a" Fig. 5, stand as monuments to the failure of our first attempt. One fact that makes this failure more significant, is that prepared blueprints were used and carefully followed. Is it possible that some blueprints are made and placed on the market without being tried out?

The first time the teeters were overloaded (and they always are) they collapsed. As a result, the supports shown in the figure were designed. They are not beautiful but they have defied many an overload and are giving good service.

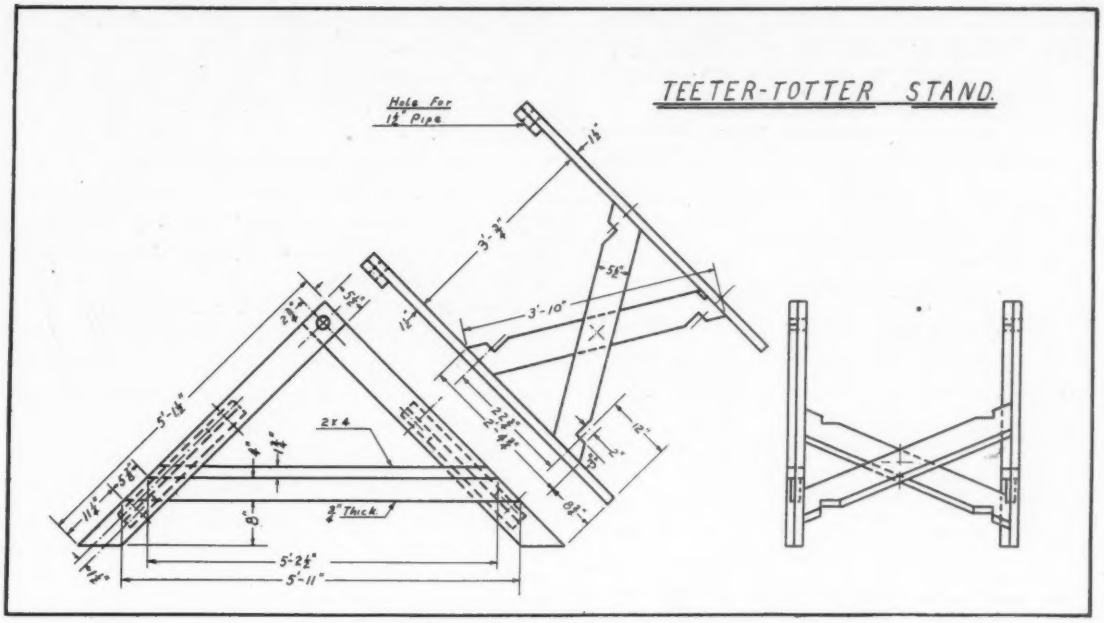
Two large swings have been mentioned in previous paragraphs. They may be seen in Figs. 1 and 2. Actual trial showed that these swings were too high (22″) to be practical. Too much time and energy were required to "pump up". As a result, it was decided that some remodeling must be done that would cause these swings to pay dividends. Fig. 6 shows how the problem was solved. A carriage was built similar to that of a lawn swing. This was suspended by the four ropes of the two large swings. A change had to be made, of course, in the method of attaching the ropes at the top. Two of the ropes are taken from their own rings and spliced into the two rings containing the remaining two ropes.

The method of propelling this swing is rather unusual and its evolution very interesting. It was originally intended that the swing would be propelled by pulling on the ropes shown at "a" Fig. 6. This method proved unsatisfactory on account of the height of the swing. So it was for the inventive genius of youth to devise a successful method of propulsion. Very soon after installing, the boys began standing on the backs of the seats and "pumping" in order to get up desired speed. Consequently the strips "a" Fig. 6 were added for foot rests. Two boys stand on these and "pump", while the two passengers pull on the ropes. These are attached to a 2x4 cross-piece shown at "b" Fig. 6.

Our experience with this playground apparatus leads us to say that one important consideration in building swings is the bearings. At first eyebolts and



THE SWINGING CARRIAGE.



DETAILS OF TEETER-TOTTER STAND.

hooks were used, made from mild steel from the blacksmith shop. One day two boys were "pumping up" in one of the small swings shown in Fig. 1. Suddenly something gave way and a spill resulted. Upon examination it was found one hook had been cut through and had let the swing down. Other hooks were found just ready to give way. They were all taken down and an interview with the blacksmith resulted.

As a result, all swings constructed since, have had for a bearing a ring and eyebolt. These parts are case hardened. After being put in place, plenty of grease is used. Success has rewarded our efforts and even the ring and eyebolt shown at "c" Fig. 6 is standing up well under the enormous strain it is frequently called upon to carry. So if steel of ample size is used; if a ring is used instead of a hook; if all wearing parts are case hardened; and if plenty of lubrication is used; we feel that good swing bearings can be obtained without the use of expensive roller bearings.

TOYS MADE IN THE CLASSES OF MISS CORA B. MINER, SYCAMORE, ILL.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

FINDING THEMSELVES.

"The ideal is, every teacher a vocational counsellor." "What the average boy needs is a little encouragement." "With a little help, boys will find themselves."

These statements come from persons of some experience appointed to give vocational advice and counsel to the boys of congested districts. With such optimistic conclusions before us, our concern over the matter might be much relieved, for may it not be taken for granted that the good teacher will give the average boy a little encouragement?

Alas, we recall that but a few years ago the Bureau of Education announced that seventy per cent of all the boys were leaving school before the end of the seventh year!

We recall that various remedies for this serious condition of affairs were proposed—Vocational Training, Industrial Education, Part Time Schools, etc. Can it be that, in some mysterious, off-hand way, these remedies have been applied and have been so effective that all that is now necessary is a little encouragement from the teachers?

Then again, we read from a current magazine this statement: "We hear less of vocational training than we did—for good reason—since its utility is passing. Presently we shall hear more of avocational training, which shall give every youth destined for a mill or office a hobby for the center of his garden." Ah, so that is the situation! The inevitable occupations of humanity may be resolved into mill and office jobs, both of which are so nearly automatic that no especial training is necessary to do the work of earning a living, and the schools may be devoted to avocational betterment of the average boy.

These various statements are so various and we know so much about boys, having had to do with many, that we are inclined to doubt.

We are not inclined to believe that just a little encouragement will lead the average boy to find himself.

We do not believe that the schools have changed their work so materially that the average boy is now inclined to go to school as long as he should go or could go to advantage.

And we certainly do not believe that modern mechanical device has reduced the need of industrial and vocational education to a point where the average boy can be committed to a senseless vocation for a livelihood and devote himself to an avocation in school. These statements must be the result of a limited experience or the fancied need of writing articles for publication.

We are inclined to the belief that with encouragement there must be offered work that will appeal to boys of various interests and ambitions; work that is an evident part of the life they see about them and in preparation for that life.

We are impressed with the conclusion of A. H. Edgerton in the Industrial Arts Magazine of October: "The self-finding period demands appreciative insight into a sufficient number and variety of representative experiences to try out, discover and develop ability for understanding and doing, as well as managing and supervising industrial work."

LOVE YOUR NEIGHBOR.

Each year brings emphasis on some one necessity in education.

This year especial emphasis is put on the development of community interest. This interest can hardly be overemphasized in school affairs or business.

Percy MacKaye relates how a community drama under his direction succeeded in bringing together in leading roles, a boot-black and a millionaire. When people of diverse interests and occupations are led to some common purpose the result is often better than the fulfillment of the immediate purpose.

The community singing, the community drama, the community pageant, the community problem in school work, are the modern substitutes for the old-time barn raising and corn shucking bee. They bring together with a common benevolent purpose the butcher, the baker and the heat and light magnate; not for selfish business advantage but to develop interest in each other.

It was related in one community conference this year how the commercial club of a small Illinois town was developed into a thriving, helpful organization by a leader who saw the light.

This commercial club will not sponsor the pernicious street carnival of last year again. In place of importing doubtful entertainment for a week of revelry with the misguided idea that the merchants may profit by a rush of business, this little city will have a community performance in which many of the citizens will take part and in which all of them will take pride.

The teachers of our schools, no less than the business men of our communities, are so much concerned over the immediate success of their personal interests that they often fail to promote the common interests on which they are dependent.

Intense rivalry is not uncommon between the departments of a school. Difficulties between the teachers of allied subjects as art, home economics and manual arts are frequent.

These difficulties will be adjusted when the teachers get together and forget their personal interests in the more important interests of the pupils and the community.

The community problem in school is a fine opportunity for such cooperation. The time has come for a loss of faith in rivalry and competition as the life of education or trade.

We are not so certain as before that competition can be made fair by recognizing that life is a handicap race, for the only victory that has no element of defeat in it is the victory over self in favor of our neighbor.

MANUAL TRAINING, PAST AND FUTURE.

There was a time not long ago when teachers of manual training placed the whole emphasis on tool processes. They were concerned with the task of inducing as much skill as possible in a few mechanical operations. These operations or processes were in large measure disconnected from jobs to be done or needs to be met.

Now, the operation or process has been subordinated to its proper place. It has become an *incidental* matter—not an unimportant or neglible matter, but a consideration that necessarily *follows* the meeting of important needs or demands set by the real task in hand.

As a result of this changed point of view, we now have the enriched program in which industrial information, characteristics of materials, construction plans and methods, principles of production, etc., have a distinct and important place.

This yielding of manual training to the broader conception of education has saved it from trouble and possible elimination from the curriculum. There is yet need, however, for a liberalization of the courses in manual training. There is need of a greater variety of experience with a large number of materials. A more or less abstract course in hand woodworking is wholly inadequate.

Give manual training a rich content, a variety of materials and experiences, and a contact with real industrial life and you will have a subject that can command a permanent place in the curriculum.

ARMISTICE DAY.

Armistice day has just passed. The day has been fittingly celebrated as the time when the world not necessarily returned to sanity but where from sheer exhaustion it lapsed for a time at least from its madness.

The Eleventh Day of November will remain for all time as one of the great days of all days. On that day three years ago all hearts were turned in hope and prayer and expectation toward a peace that might bring solutions of many problems that had vexed the past.

New hope was held out that the war had taught us many things concerning schools and education and psychology. In the reactions that have followed, the educational world has partially lost sight of some of the most important lessons. Financial distress has aggravated the situation. The absence of some of our best teachers left the schools unable to take immediate advantage of the lessons taught. The confusion and disturbance have jostled us back into the ruts again. It will probably take another period of groping before we realize the full significance of the spirit and vitality which the needs created by the war brought to the schools. In another decade perhaps, we shall be far enough from the war to read clearly its lessons and recovered sufficiently from its disaster to undertake anew to profit by its lessons.

So, as the Eleventh of November, comes and goes through the years, we shall stop a moment and turn our faces sorrowfully yet proudly as Americans toward the past, and then with resolution and high hope face the problems of the future.

COOPERATION NEEDED.

There has always been too much dogmatism in education. The old educationists and the new educationists are exactly alike in their attitudes. For the most part, both groups are dogmatists. Neither can see the good of the other side nor the faults of their own.

The only hope for the schools and for education in general is for these groups to get together and to work together. It sounds like *pedaguese* to say that the more these groups get together the less they will be apart. But in a very real sense, the more the opposing groups come together and discuss the common problems of the schools, the less they will find themselves in disagreement.

Industrial and vocational education people and the general education people must get together and understand one another; they are both holding vital sectors in the battle line against ignorance and inefficiency. To fight with each other is to join forces with the enemy.

TITLE PAGE AND INDEX.

The publishers of the INDUSTRIAL-ARTS MAGAZINE have prepared a title page and index for Volume VI, which closes with this issue and will send a copy postpaid to any reader. Requests should be addressed to the Subscription Department, INDUSTRIAL-ARTS MAGAZINE, 129 Michigan St., Milwaukee, Wis.

TWO IMPORTANT FEATURES FOR EARLY ISSUES.

In the January issue of the INDUSTRIAL-ARTS MAGAZINE will begin two important articles which will continue through several issues of the first half of the year 1922. Foremost among these will be a treatment of the problems of *The Organization and Teaching of Industrial Subjects in the Part-Time or Continuation Schools,* by R. H. Rodgers, Specialist in Part-Time Schools, New York State Education Department, Albany, N. Y.

Reproducing Antique Furniture in the School, by Herman Hjorth, Director of Industrial Work, Baldiotry School, San Juan, Porto Rico. Illustrated with photographs and complete working drawings.

Models for Mechanical Drawing

Herman Hjorth, Director of Technical Work, Roman Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico

THE teacher of mechanical drawing is often confronted with the problem of securing suitable models for his work. This problem has been solved in our school by Mr. Jose M. Garcia, teacher of mechanical drawing, in an original and satisfactory way.

The models illustrated in Fig. 1 are designed for work in elementary orthographic projection. They are all made of bristol board and developed in such a way as to give added strength to the corners, (Fig. 2). Fig. 3 shows the hexagonal prism glued together and the cube ready for gluing. The models are finally covered with white paper, which make them more distinct, bringing out all the shadows and highlights.

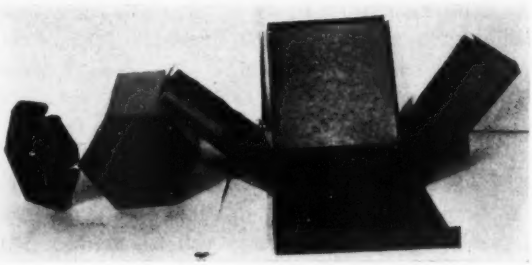


FIG. 3.

These models are inexpensive, easy to make, light, and at the same time very strong. Fig. 4 shows the hexagonal prism supporting a cast iron surface plate weighing 35 lbs. They are not damaged if they fall on the floor, and they are suitable both for mechanical and freehand drawing.

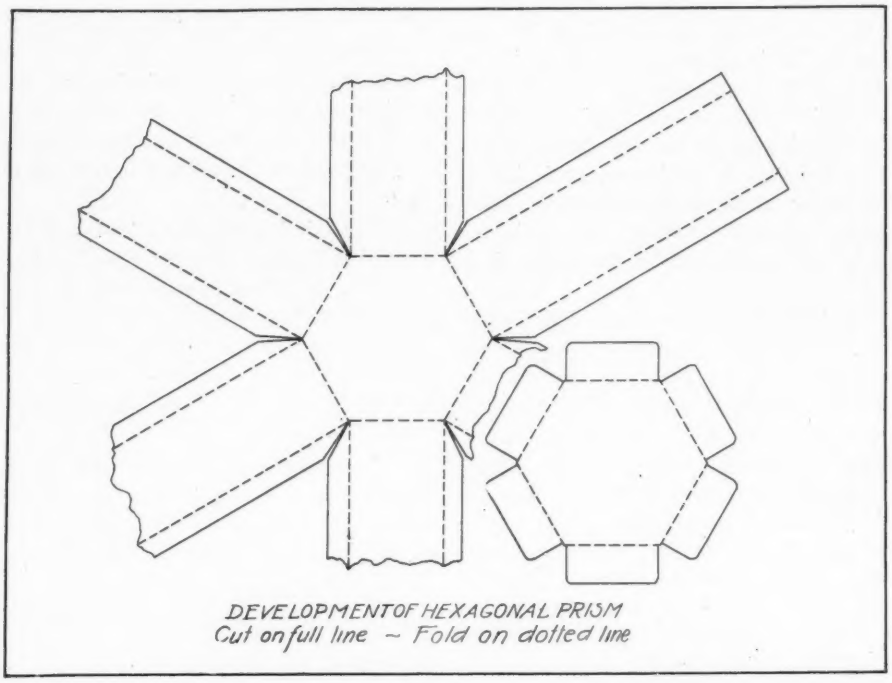


FIG. 2.

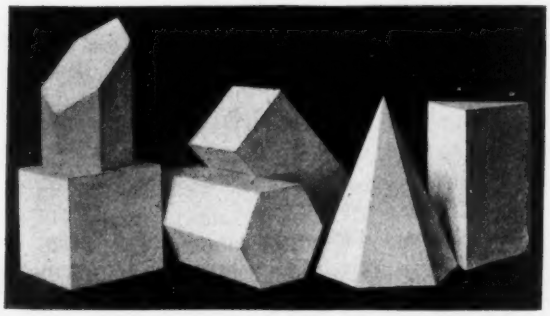


FIG. 1.

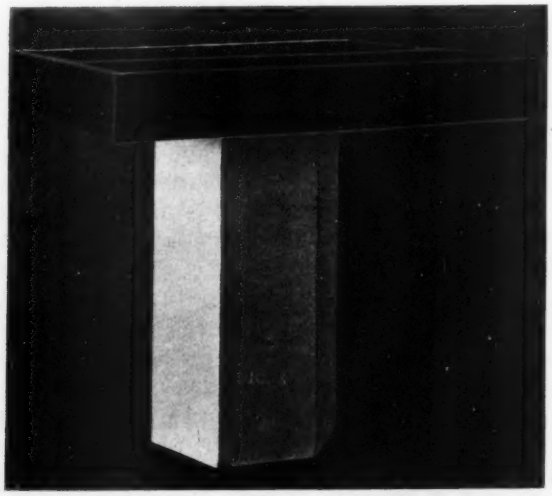


FIG. 4.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

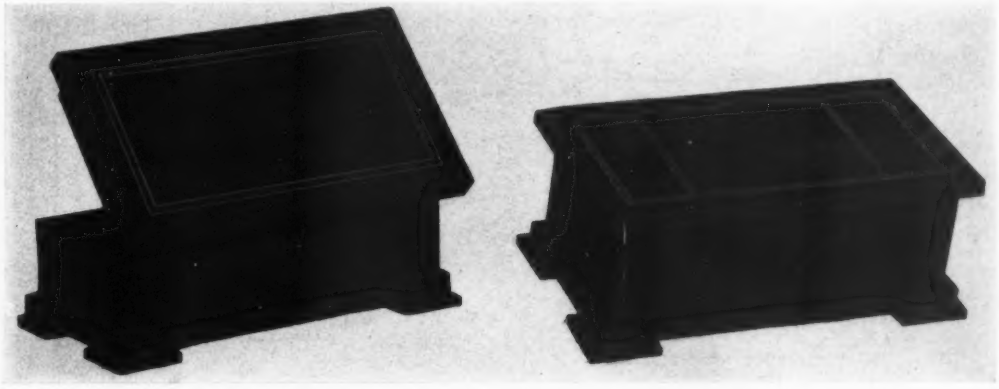
CHRISTMAS PROJECTS.

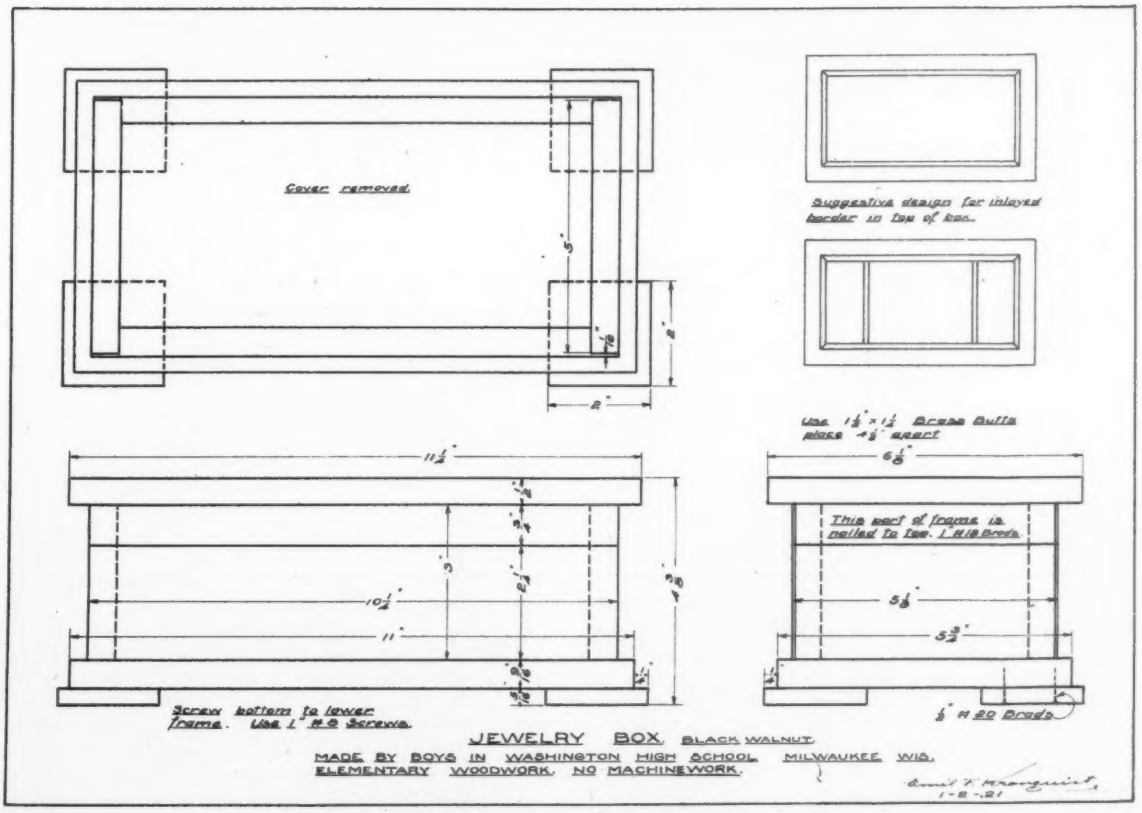
Emil F. Kronquist, Milwaukee, Wis.

Bud Vases.

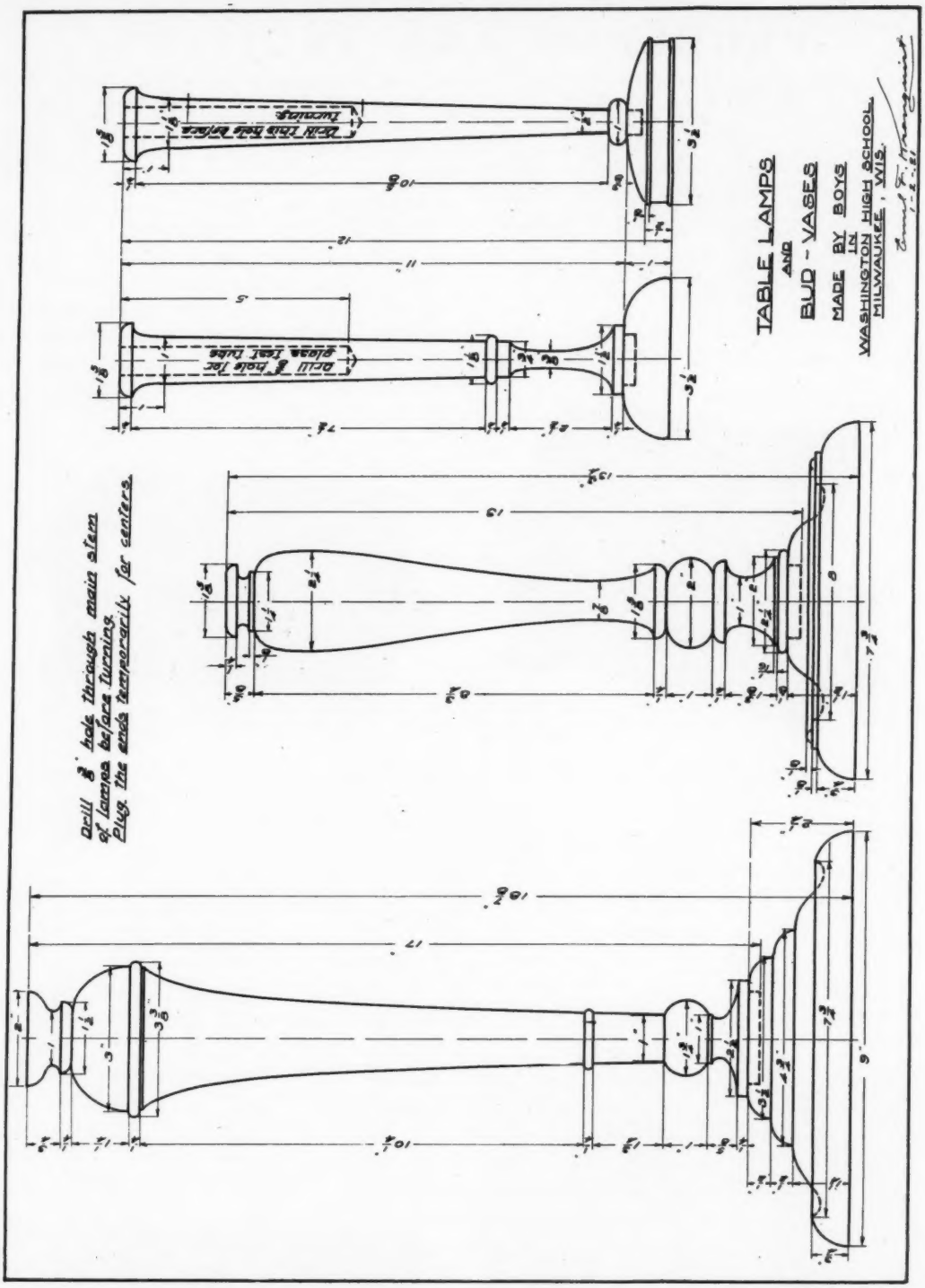
After the preliminary exercises have been made to familiarize the boys with the different turning tools and methods, this problem is attractive and interesting, and affords the teacher a good chance to point out the difference between good curves and bad curves.

The steps in turning should be carefully followed; no haphazard method allowed. Always make it a point to outline the steps as in Fig. 1.




Cover removed.
Suggestive design for inlayed border in top of box.
Use 1½" × 1½" Brass Butts
This part of frame is nailed to top. 1" #18 Brads.
Screw bottom to lower frame. Use 1" #9 Screws.
JEWELRY BOX. BLACK WALNUT.
MADE BY BOYS IN WASHINGTON HIGH SCHOOL MILWAUKEE WIS.
ELEMENTARY WOODWORK. NO MACHINEWORK.
Emil F. Kronquist
1-2-21

BOXES DESIGNED AND MADE BY MR. KRONQUIST'S CLASSES.



Drill the hole for the glass test tube first on the lathe, using a drill chuck and a twist drill. If made of black walnut, finish by an application of Bicromate of Potash (make a saturated solution of Bicromate of Potash and water), then a dark filler and two or three coats of wax.

Book Ends.

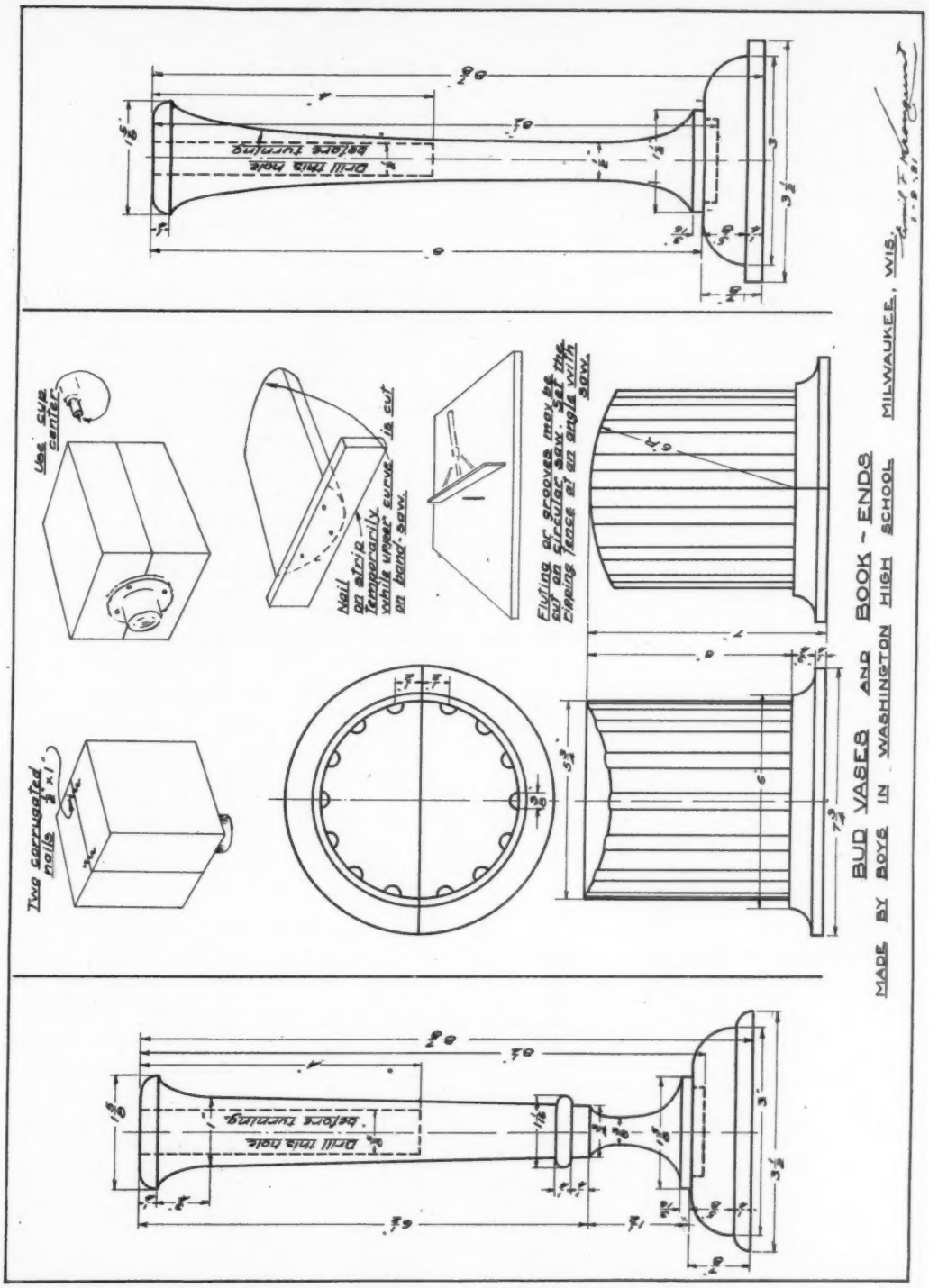
This problem is somewhat difficult and requires great care in preparation, but it is not beyond the ability of the average boy.

If made of black walnut it makes a very handsome piece of work and it is also very practical.

Jewelry Box.

This box was made as an experiment in the elementary woodworking class (first semester freshman in high school who are not allowed to do machine work). It turned out beautifully and a great deal of enthusiasm for the work was created. It was made of black walnut and given as a class project to a class of 22 boys.

To inlay the border prepare a few marking gauges to cut a good clean line, then cut with chisel across the


BUD VASES AND BOOK - ENDS
MADE BY BOYS IN WASHINGTON HIGH SCHOOL MILWAUKEE, WIS.
Drill this hole before turning
Use eye center
Nail on stair temporarily while upper curve is cut on band saw.
Flying or grooves may be cut on circular saw. Set the fence fence at an angle with saw.
Two corrugated nails

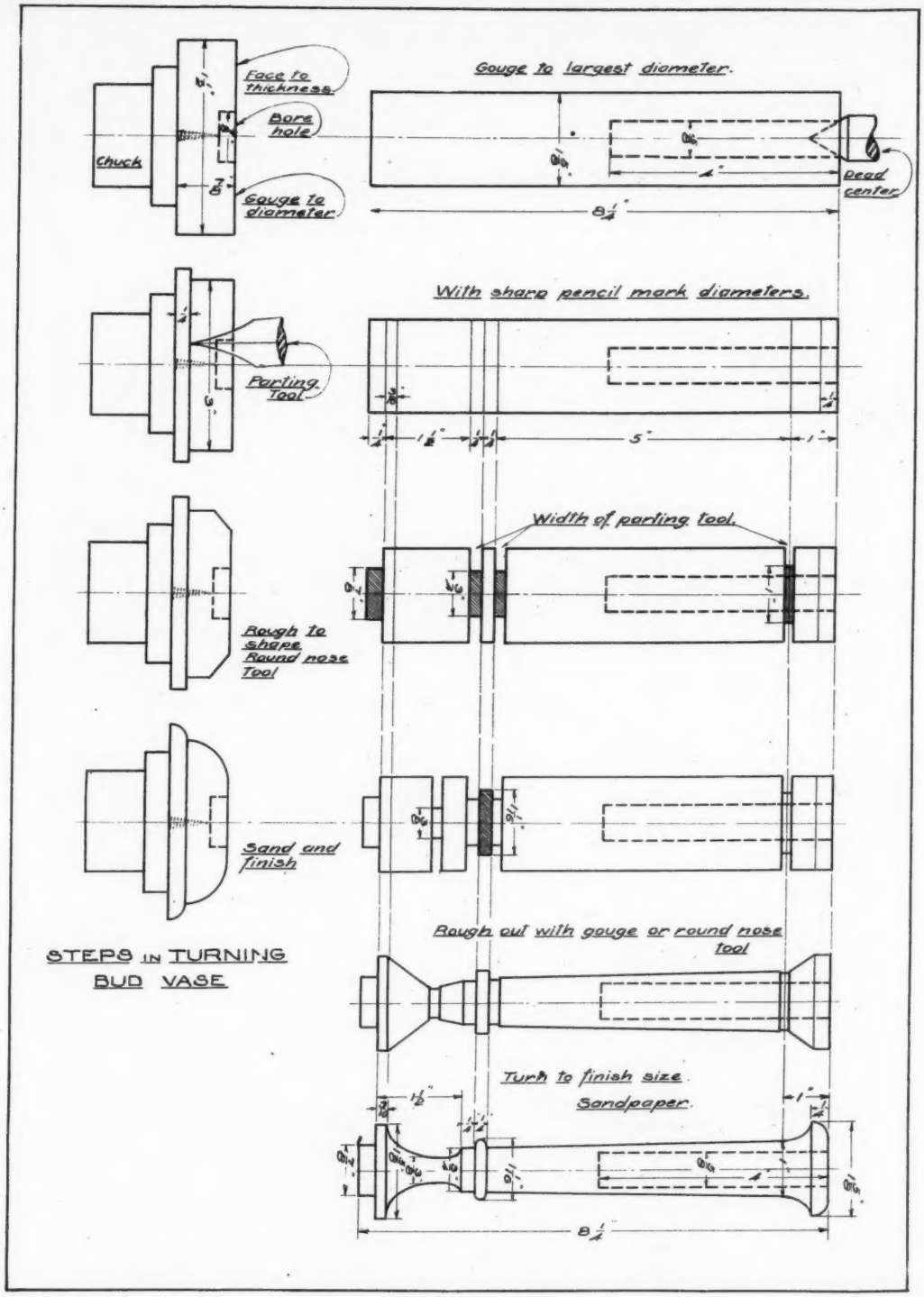
grain a shallow trench and fit in border. In gluing in border use a not too thin hot glue, cover with a piece of paper and a board, then clamp. The top can be planed down without injury to border, if the tool is sharp and shallow set. To finish, apply two coats of white shallac, then two or three coats of dark prepared wax. It would perhaps be of interest to know that the inlay borders can be obtained from J. Bernard & Co., 422 E. 53rd St., New York, at a very low cost. The most exquisite border can be had for about ten cents per yard. A few samples, I am sure, can be obtained for the asking. The border shown in box 1 is No. 81½ costing seven cents per yard. No. 2 is border No. 681.C, costing eight cents per yard.

TWO PROJECTS IN BENCH METAL WORK.

Eber L. Moore, Connersville, Indiana.

The Kettle Stand illustrated in the accompanying working drawing is an excellent problem for agricultural metal working classes. The stand can be used for holding milk pails, but is better adapted for holding heavy kettles.

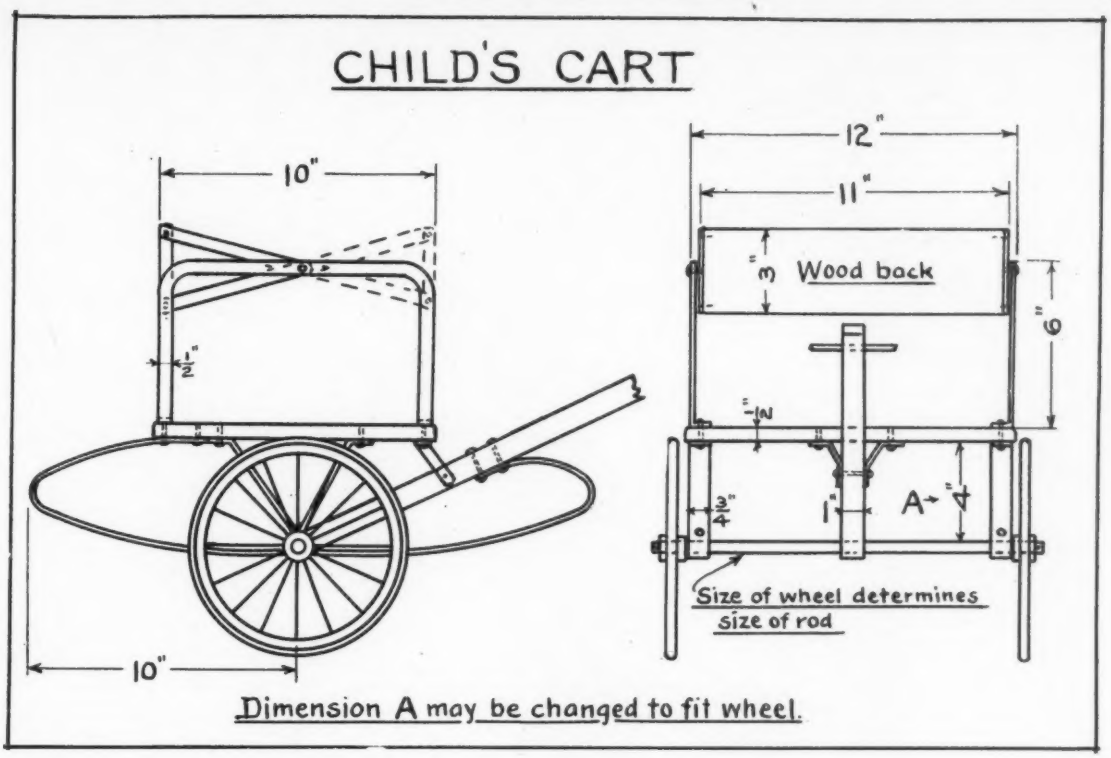
The stand is made of ¼ inch by 1 inch strap iron.

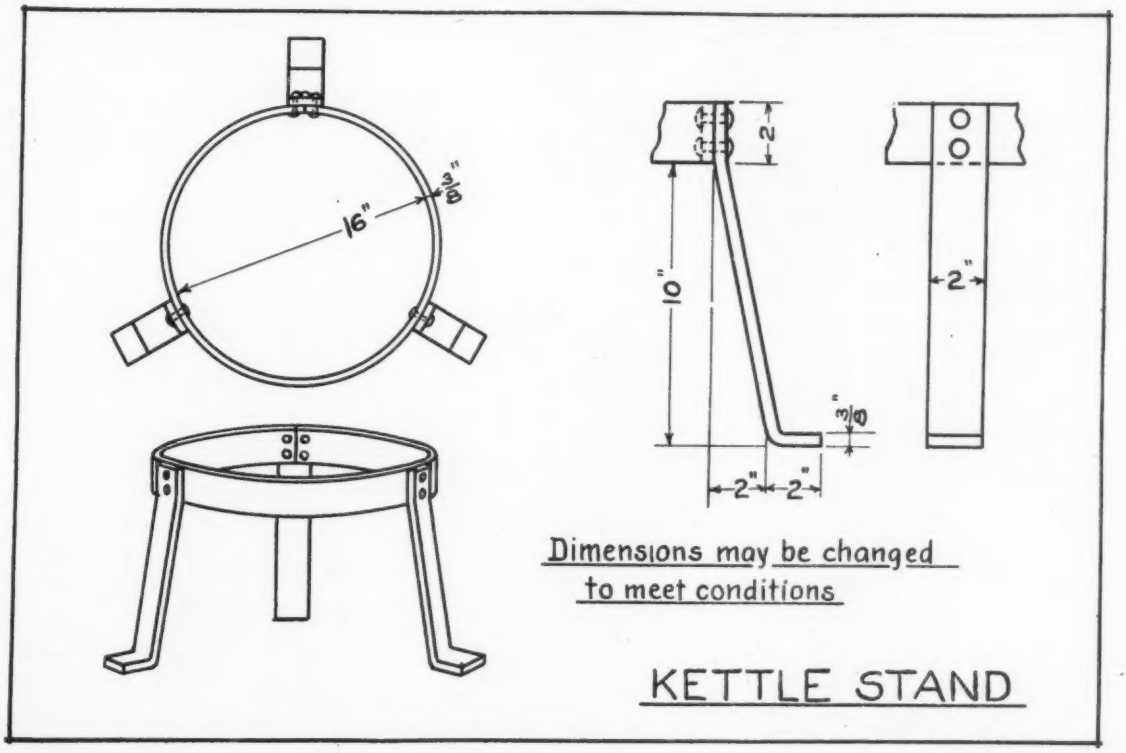


All the bending and fitting with the exception of the right angle at the top may be done cold. Care should be taken to get the legs exactly alike. A circular template of wood should be made to shape the circle that connects the legs.

Child's Cart.

The childs cart is a little complicated in its assembly, but simple in its construction. A set of wheels should be at hand before starting this problem. The first step in the problem would be the chassis construction. A steel rod determined by the size of the wheel axle, should be cut to the length 12", plus the width of the hubs of the wheel, plus ½" for keys to hold wheels on. The two V shaped brackets on which the seat is to be fastened, should be made next. The bottom part is shaped around the axle and a rivet placed just above. The arms of the V shaped bracket are bent at 45° to axle. Next the bumper, which fastens to the handle at two points and to the rear of the seat should be made. There is no definite shape for this and its length is based upon the height of



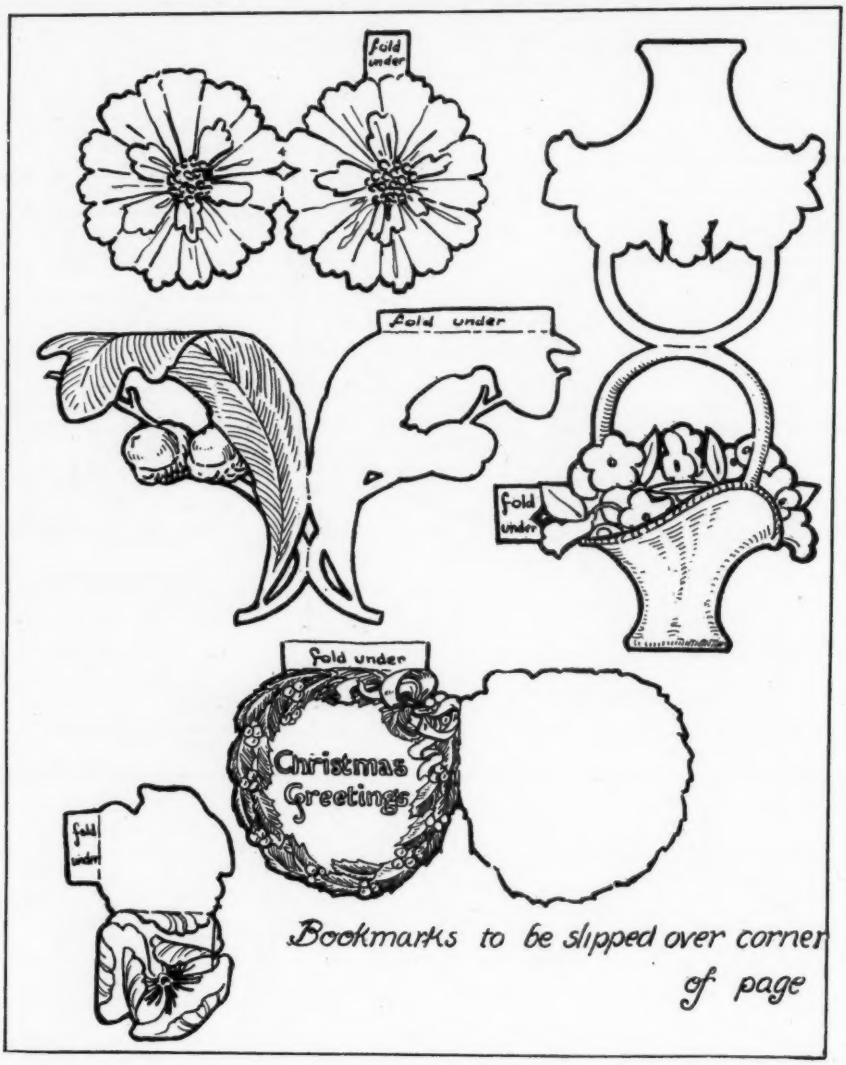


the wheels. Two small braces to hold the handle in place should be made of $\frac{3}{8}$" strap iron twisted in the middle, so that one end fits flat against the sides of the handle and the other ends fit against the bottom of the seat.

The arms are made from $\frac{1}{4}$" strap iron, the upper corners should be heated when bended.

The reversible back is hinged at the middle of the arms and is kept from dropping down when turned, by a small angle iron projecting from the inside of the arms. The back and bottom should be made of a well seasoned wood $\frac{1}{2}$" thick. The handle is connected to the axle by means of a hole through the end of it and the axle placed through the opening.

Care should be taken to have all duplicate parts exactly alike. This will eliminate all trouble in assembly.



AN EDUCATIONAL BOOKMARK.

Catherine M. Richter, Long Beach, Calif.

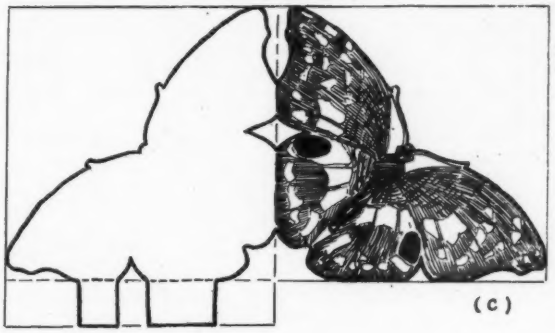
The accompanying problem is a simple one, which can be used by the teacher of the lower grades as well as the more advanced. The children make something which is attractive, which is useful, and which they will have worked out for themselves. A bookmark is something which can be made at any time during the year, to fit certain occasions or used to fill in between seasons.

In developing this project, interest can be inspired in the children if the teacher previously makes two or three examples, and displays them before the class, demonstrating its use by slipping one of them over the corner of a page of a book. If she then starts a large drawing on the board, evolving it as the children work, it saves unnecessary talking; a well-drawn picture often tells the story better than words alone. Before allowing the children to start work, it would be well to make one model before them, where they can see the development. From here on, the children take the work into their own hands, working first with used paper, or inexpensive construction paper, until they have obtained the best possible results; the finished article should then be made from good paper. The class might work out the design the teacher just completed, and then evolve ideas of their own, in the way of design.

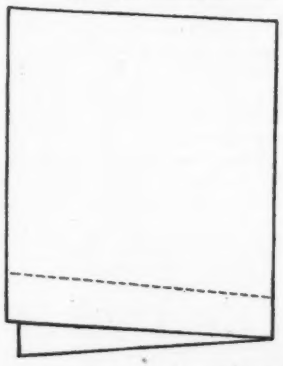
These bookmarks require little measurement—the drawing of but one line by rule. The balance is but a matter of folding and cutting, drawing and perhaps coloring. All paper should have been previously cut; the instructor must first determine what is to be worked out in a general way, in order to decide on the size of paper required. For instance, the oak leaf, butterfly and basket type of bookmark require more material than the flowers, hearts and wreaths. For anything about the size of the flowers, an oblong 2½″x4″ would be the proper size. The edges should be straight and true. Taking one of these long slips of paper, fold the two short edges together, crease the fold; this is a simple way of obtaining a right angle. Many ideas can be developed for this use, but they all must be capable of being beautifully arranged in a corner, that is, in this right angle. The teacher, if working on the board with the children, will first draw a large oblong to represent the slip of paper; she then erases half of it, to show the folded portion (a). Measuring up from the now short side of the folded paper ½″, the pupils draw a line parallel to this short edge; open out the paper and cut away the half inch strip up to the fold

(b); the remaining ½" extension forms the "paster". This is the foundation from which all these bookmarks are made (c).

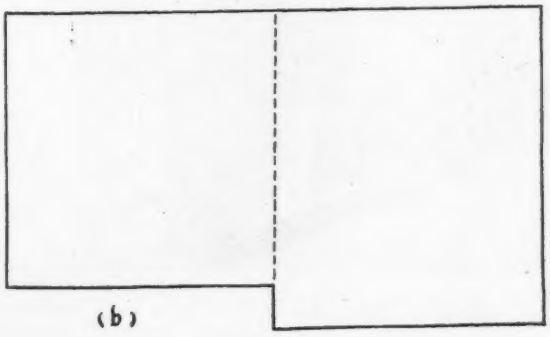
The making of the design should constitute another lesson, using other paper, for instance two-inch squares for the 2½"x4" oblongs, being certain the corners are right angles, so as to be sure that the bookmarks will fit the corner of the page. The children should first work out the same design the teacher used in demonstration. Then at the blackboard or on paper, they should work out many patterns, being careful that the design touches the two sides of the right angle. Select several of the best designs produced by the pupils and explain why they are good for the purpose; also pick out a few of the poor ones, showing their faults and what to avoid. For general purposes, nature objects are good-flowers, butterflies, leaves—especially those brilliant in color will be found pleasing. For special occasions, hearts, shamrocks, Christmas wreaths and bells, patriotic shields, and a turkey with outspread tail. A Japanese fan in black outline and bright pattern could be prettily placed in a corner. Upon obtaining satisfactory designs, they can be cut out and traced around, or redrawn into the corner of the oblong made the previous lesson. The simplest and surest way is to draw in but one corner of the oblong, then fold down the opposite side, and cut the two at one time. The



(c)



(a)



(b)

BOOK SLIP.

WORK OF THE WHITTLERS' CLUB, FORT DODGE, IA.

third lesson should be the making of the best patterns of the lesson previous on heavy construction paper, or if to be colored, on good drawing paper. Then color, if desired, cut them out, being sure not to cut away the extension for pasting the two sides together, fold and paste the extension in between the two sides. In almost every instance, the accepted bookmark should be the child's own pattern; then the teacher will have the satisfaction of knowing that her pupils have conquered a problem rather than the making of some particular thing, the good of which ends with the making thereof. She is giving an education rather than just making them skillful.

USING OUTSIDE ACTIVITY WORK.

The accompanying illustration shows some of the Whittling products of the Whittlers' Club, Fort Dodge, Ia., and is printed here through the courtesy of Mr. John M. Bice, Instructor of Manual Training in the Fort Dodge high school.

As a means of interesting the boys in the sixth, seventh and eighth grade shops, which are under his direction, Mr. Bice last spring organized a Whittlers' Club. The purpose of the club was to give boys a useful activity for holidays and vacation periods and to give them a means of physical and mental development. The club met once every three weeks during the school term after regular school hours and received instructions in the use of the knife. This included the proper position to take, the correct way of holding the knife and the selection of wood. Time was given to the planning of useful toys and household articles which could be made entirely with the knife. Most of the articles were cut out of soft pine of the best quality, straight grain kiln dried and planed. Mr. Bice found that the work was done with great interest and it was visibly effective as a means of training the hand and the eye.

CONSTRUCTIVE WORK IN CINCINNATI.

Pupils and teachers in the Department of Industrial Arts in the Cincinnati schools produced during the summer vacation of 1921 furniture and building repairs in the city schools to the value of $13,000, effecting a saving of nearly $3,000 and affording valuable educational experience for summer classes.

Under the direction of Mr. Elmer W. Christy, the shop classes in the summer schools were organized on the basis of productive work, operating eight hours per day. Among the jobs undertaken were the building of 53 flat top standard desks for teachers, twelve drawing board cabinets for high schools, benches for sheet metal shops, electrical shops and forge shops, six portable wardrobes, two lunch room steam tables. The boys rebuilt and refinished 96 lunch room tables, 90 drawing tables, and cleaned and varnished 650 chairs. They repaired lockers and 36 wood turning lathes, which after thirteen years of use were ready to be discarded. They also completed the construction of six wood turning lathes, and built 34 belt shifters. The class in electrical wiring wired nine double rooms and eight single rooms and changed the wiring in one portable school building.

In describing the work Mr. Christy writes:

During the regular school year the program provides only from one and a half hours to three hours per day for shop work for any student and the work is therefore intermittent and non-intensive. During this period it is our aim to train in the general principles of the various trades. The purpose of the summer work was to provide for those boys who have shown themselves most apt an opportunity to appy those principles in a practical way under conditions as nearly like commercial shop conditions as can be provided in a school. The results were that they acquired not only considerable skill but a large amount of practical information concerning the branch of work in which they were engaged.

"In organizing classes we employed only boys who had previously received instruction in the principles of the trade which that class represented. Co-operative students who were ready to go to work in commercial shops and for whom positions could not be found were given preference in the school shops. Their number being inadequate we employed boys from the regular industrial arts course. The rate of pay was 20 cents to 25 cents per hour, eight hours per day.

"The teachers were in all cases not only skilled in the art of teaching but practical workers in their particular trade. The work passed through the shops in units and considerable repetition was involved. The large number of different operations to be performed however, and the shifting of the boys at frequent intervals enabled each boy to receive instruction in a great many more operations than he would in a commercial shop in a much longer period. While we were organized for and worked for efficient production we did not lose sight of the educational side of the work.

"We gave each teacher from eight to ten boys and this average was maintained throughout the period. In this respect our organization differed from those in some other cities where teachers only are employed to do this class of work. We can say with assurance that our product is the result of students' work.

"We feel sure that the quality of the work will pass rigid inspection, in many cases be found superior to that which would have been received from commercial establishments under competitive bidding. One of the most delightful features of the summer work was the splendid attitude of both teachers and students. I feel sure that those who were kind enough to visit the classes while in operation appreciated the vigorous way in which the work was being carried on and the joy which the students were experiencing in the creation of a really commercial product.

"In figuring costs we have included the boys' wages, teachers' salaries, cost of material, cost of supervision and services of a millwright. We have not included the cost of operating the plants nor the depreciation of equipment. The market value of products is however, a very uncertain quantity. In the matter of teachers' desks we used the figure which the Board would have had to pay at the time the order was placed; for the drawing board cabinets we had a bid of $180 each while we figured them at $160; for the new part of the serving counter at Woodward we had a bid of $400 but for additional work raised the value to $500. For the electric wiring we figured each room at $150. Taking into consideration bids for similar work and the better fixtures used this seemed reasonable. On other orders we have made estimates which we believe to be conservative.

"For the summer work the final report indicates the following:

Salaries and wages	$ 6.017.22
Materials	4,176.65
Total	$10,193.87
Value of product	$13,046.00"

VOCATIONAL EDUCATION BEING DEVELOPED IN BERKELEY.

Vocational Education at Berkeley, Calif., has been in process of development for the past three years. The first classes were part-time classes in home economics.

The director of vocational education who was appointed in May, 1920, is also general administrator of all vocational and part-time education in the city and is responsible for the supervision of industrial work. Since the first of May, 1920, the number of special industrial teachers in the city has been increased from ten to 21. In the sixteen elementary schools, the industrial work is

DRAWING BOARD CABINETS MANUFACTURED BY THE INDUSTRIAL ARTS DEPARTMENT, CINCINNATI SCHOOLS. Elmer W.Christy,Director.

correlated with instruction in other school subjects. In the fourth, fifth and sixth grades the class teacher, who is also the teacher of art, spends half the time during which her pupils are receiving home economics and manual training, with each of the special teachers. The purpose is to offer a definite opportunity for correlation of class instruction with special subjects.

In the junior high school, the industrial work is being developed in conformity with the general program now under way to make the school an "exposure and occupational finding" laboratory. In the prevocational industrial department, instruction is offered in mechanical drawing, printing, electric shop practice, wicker furniture construction, radio, carpentry, shoe repair, cabinet making, cement work, pipe fitting, elementary plumbing, painting and finishing. During the coming year it is planned to introduce courses in machine shop practice and automobile repair in the junior high school.

In the senior high school, instruction is offered in printing, machine shop practice, cabinet making, carpentry, pattern making, automobile repair, electric shop practice, mechanical drawing and related subjects. The industrial work is of two types, namely, academic and vocational. At the present time, seven vocational industrial classes are provided in the subjects of printing, machine shop practice, electric shop practice, mechanical drawing, pattern making, automobile repair, in addition to a number of part-time vocational industrial classes.

Recently two full-time vocational home economics classes were organized. One of these is a cafeteria management class in the senior high school, and the other is a vocational home making class in the Burbank Junior High. A total of fifteen part-time vocational home economics classes are also in operation. The commercial classes while not operating under Smith-Hughes regulations, are practical courses of training for certain commercial occupations.

In addition to the full-time courses, special opportunities are being offered in the part-time high school for short intensive periods of work. There are also a number of part-time vocational commercial courses for the training of stenographers and bookkeepers. Practically all of the courses mentioned are in operation in full-time, part-time and evening high school classes.

EASTERN ARTS ASSOCIATION PREPARES FOR MEETING.

A meeting of the council of the Eastern Arts Association was held in New York City on October 15th, on the call of President F. P. Reagle of Montclair, in order that plans might be made for the next or twelfth annual convention of the association at Rochester, N. Y. It was decided to place the dates for the convention on Thursday, Friday and Saturday, April 6, 7, 8, 1922. This is a change in the previous custom of having the meeting include Good Friday. It was made in order that members of the association might have the opportunity of visiting the Rochester schools while they are in session.

The main topic of the program will be—"The Place of the Manual, Industrial, Household and Fine Arts in the Junior High School." This type of school is one of the features of the Rochester school system, and the work of these schools should prove most interesting to the visitors.

The slogan of the program and membership committees is to be—"Each And All—Rochester—1922". Miss Frances Bachelor, vice-president of the E. A. A., who is chairman of the program committee, made a report showing progress toward securing speakers for a most interesting program.

James F. Barker, assistant superintendent of schools of Rochester and a member of the council of the E. A. A., was appointed chairman of the Rochester local committee. Mr. Barker is to organize the various committees necessary to the success of the convention.

Merritt W. Haynes, secretary of the E. A. A., tendered his resignation, which was reluctantly accepted by the council. Mr. Haynes is to leave the position which he has held for many years as principal of the Bayonne (New Jersey) Vocational School to go to Indianapolis to assist Director Hawkins in the educational program of the Typothetae.

MR. FRANK E. MATHEWSON,
Jersey City, N. J.,
New Secretary of the Eastern Arts Association.

It was then decided to combine the work of the secretary with that of the publicity chairman, and Frank E. Mathewson of Jersey City, a former president of the E. A. A., was elected secretary.

There are now seven hundred members of the E. A. A. and a strenuous effort is to be made to increase the membership to twelve hundred before the Rochester convention.

The Council then adjourned to meet again in Rochester some time during December.

FIFTEENTH ANNUAL CONVENTION.

The fifteenth annual convention of the National Society for Vocational Education will be held January 5, 6, 7, 1922, at Kansas City, Mo. The meeting which promises to be one of the largest in the history of the Society is in charge of Mr. C. A. Prosser, chairman of the program committee.

It is planned to devote two full days to sectional meetings on agricultural, industrial and commercial education, home making training, part-time and continuation schools, training for the industry, industrial rehabilitation and teacher training for vocational classes.

The general sessions of the convention will occur on the first day and the business session will take place on Saturday, the last day of the convention.

One of the features of the convention will be an extensive exhibit of plans and specifications of buildings constructed for vocational school purposes. The exhibit will include floor plans, elevations, photographs of exteriors of buildings and special interior features, construction data, and number of pupils to be accommodated in buildings. Hundreds of buildings for vocational purposes are to be erected during the next five years and the exhibit is intended to meet a demand for information regarding building construction.

Another feature will be an exhibit of vocational material in the form of mimeographed, typewritten and printed pamphlets on the subject of agriculture, commercial and industrial education, home making and teacher-training work.

WISCONSIN MANUAL ARTS MEETING.

The Manual Arts Teachers of Wisconsin met at Eau Claire, Wis., on October 21st, with Mr. Clyde A. Bowman as chairman of the meeting.

Mr. H. C. Thayer of Stout Institute spoke on the subject of "Grading and Promotion on Ability in Mechanical Drawing;" Mr. Charles Beardsley, of Eau Claire, discussed "Professional Lessons for Manual Arts Teachers from Vocational Classes," and Mr. Hans W. Schmidt, State Director of Manual Arts for the State, took for his topic, "Wisconsin Manual Arts."

MR. BAXTER AND THE WINNING TEAM.

WIDE AWAKE CLUB HANDICRAFT TEAM WINS FIRST HONORS.

St. Johnsbury Boys Lead Among Twenty-Eight Teams.

The Handicraft Team of the Wide Awake Home Project Club returned from Camp Vail, Springfield, Massachusetts, after a successful week at the Eastern States Exposition.

Professor Jenkins of Delaware, who judged the demonstrations of all the teams, remarked that the team work and finish of the team was the best he had seen. The great point brought out was that it was not merely a team trained to exhibit before an audience but was a team which showed by the photographs, taken during the past year, the work actually done by the club.

One of the projects demonstrated was the mixing and placing of a section of concrete walk and by explanations showed the many practical ways concrete could be used on the farm. Various walks laid by the club members for people in and around St. Johnsbury were clearly shown by photographs. Other projects demonstrated were the making of some dozen or more knots and splices and how they could be applied on the farm, the sharpening of scissors, sharpening and care of farm tools, the preparation of wood for finish, showing the sanding, staining, filling, varnishing and polishing of the same, and the method of removing and repacking a leaky faucet.

The boys were the youngest team at the camp, their ages running between 12 and 13 years. Mr. Farley, State Club Leader of Boys' and Girls' Club work for Massachusetts, remarked when presenting the medals, that it was a foregone conclusion that the Vermont team would win first prize as they had never been beaten in the five years that the Eastern States Exposition had been running.

The boys behaved like veterans before the large crowds and spoke clearly and to the point and instantly answered all questions asked in a convincing manner. In the judging the boys scored first with a total of 260 points, the highest of any team, one boy scoring 94 and one-half points. In demonstrating the St. Johnsbury team scored the highest of the 28 teams representing the very best club members of the North Atlantic States, having a total of 96 per cent.

The week spent at the camp was of a vital educational nature. Brought in contact as the boys and girls were with the select of the other states, it meant that they had to show exceptional ability to be returned winners. The opportunity to see some of the world's finest cattle and products, the chance to hear lectures and demonstrations by expert men and women in various lines of industrial life brought the subject directly to them in a far more vital and interesting way than a similar subject could ever be presented in the classroom.

If only those people who do not clearly understand the wonderful character of club work could have been with the boys and girls at Camp Vail they would have seen why Uncle Sam, together with State College and State Extension Service, backed boys' and girls' club work to the limit and each and every one will be a booster for this great work.

TECHNICAL COURSES IN NOVA SCOTIA.

The Nova Scotia Technical Institute, at Halifax, stands at the head of the technical education system of the province of Nova Scotia. Four-year courses in mining, electrical, civil and mechanical engineering are given which lead to the degree of bachelor of science in engineering. Short courses of three months are offered during February, March and April to men engaged in land surveying, steam engineering, machine design, architectural drafting, structural steel drafting, electrical machinery, coal mining engineering, metallurgy of steel, technical chemical analysis and assaying.

Coal mining evening technical schools are carried on each year during the winter months in fifteen coal mining districts, giving instruction in the preparatory subjects.

Evening technical schools established since 1908 offer instruction in preparatory English and arithmetic, practical and shop mathematics, single and double-entry bookkeeping, dressmaking, millinery, household management, architectural drafting, electricity, land surveying, industrial chemistry, building construction estimating, machine shop practice, and ship drafting. During the past year two new divisions in fisheries and correspondence study have been added. The fisheries schools are conducted in fishing districts and offer instruction in navigation, marine gasoline engine operation and repair, fish handling and curing, marine business and first aid.

The correspondence division offers instruction by correspondence to the rural population in the subjects of elementary English and business English, business arithmetic, bookkeeping, salesmanship, accounting, mathematics, steam engineering, automobile mechanics, heating and lighting for janitors, plumbing, practical mathematics for electricians, electric wiring, mechanical drawing, machine design, blue print and plan reading, estimating, architectural drawing.

The director, Mr. F. H. Sexton, and the assistant, Mr. G. A. Boate, are graduate engineers and have received their education in mechanical and electrical engineering. They have an international reputation for their advanced work in engineering and education.

NEW BOOKS.

Lessons in Lettering.

By Thomas E. French and William D. Turnbull. Paper, 40 pages. Book I. Price 35 cents. McGraw-Hill Book Co., New York, N. Y.

This book is made up of a series of lessons and practice exercises in single stroke gothic lettering, such as is used widely in mechanical drawing. The book wastes no space in preliminaries but describes the construction of the several letters and gives practical directions for doing the several exercises. The letters have been grouped according to straight and carved lines as well as capitals and small letters. Due attention is given to spacing, to the special problems of paragraph writing, dimensioning, map lettering, symmetrical titles, etc. The book appeals to us as the most readily teachable book produced up to this time.

Wood Turning.

William Fairham. The Woodworker Series. Cloth, Octavo, 150 pages. J. B. Lippincott Co., Philadelphia.

This book described the usual processes of spindle and chuck turning and goes into considerable detail on such advanced forms of work as split, spiral, hollow, ball and square turning.

Bethlehem Trade School News is the title of a school publication issued by the printing class of the Bethlehem, Pa., Trade School for the annual graduation. The contributions, except for a brief history of the school, were made by the boys and reflect the activities of the machine shop, electrical, woodworking, science and academic departments. Mr. James C. Tucker is director of the publication.

RECEIVING THE RETURNS OF THE WORLD SERIES.

RECEIVE WORLD SERIES RETURNS BY HOME-MADE WIRELESS TELEPHONE.

About three days before the opening game of the World Series of New York it became known among the students of the East Orange high school, that returns of the games were to be announced by wireless telephone, play by play. The interest became so great that it was decided to hook up the home-made wireless apparatus, which the high school has, to build a bulletin board and to give the returns to the school.

Under the direction of Mr. E. W. Tuttle, head of the Manual Arts Department, the project was worked out. The class was devided into groups and about fifty boys rendered some service in connection with the work. About fifteen hours' time was spent in preparing the entire apparatus, including the putting up of the aerial, the connecting of the wireless apparatus, the planning, construction and painting of the bulletin board, the studying of methods of operation, and the printing of cards for the various players, tallies, etc.

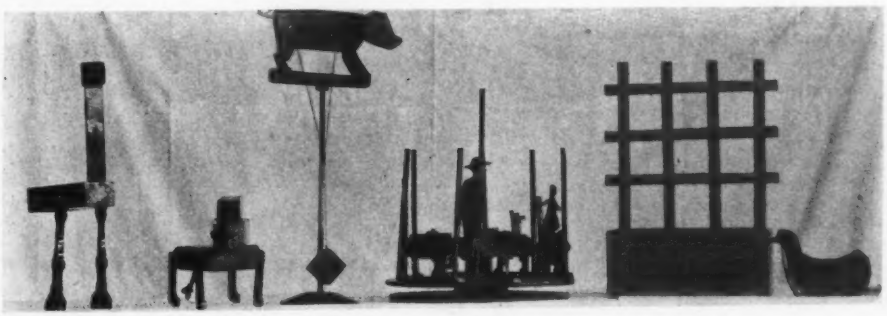
The actual service operating time of announcing of the returns and of plays of the eight games was about fourteen hours. It was found that the project was related very closely to other types of ordinary classwork and shopwork, and aside from the actual operation of the bulletin board and the directing of the crowd, the activities involved were common to the every day school shopwork.

The difficulties of the project were few and so far as could be learned the only draw-back was the fact that the games began at 2:05 p. m. and the school session closed at 2:30 p. m. This handicap was overcome satisfactorily by combining the earlier returns to the practical arts shops, where the receiving apparatus was installed, until the end of the afternoon session. The small illustration shows only a small part of the large crowd which gathered in the area of the school and followed the plays with intense interest.

SALARIES OF SUPERVISORS, OR DIRECTORS, IN 53 LARGE CITIES IN 1920-1921.

Compiled by Bertha Y. Hebb, U. S. Bureau of Education.

Cities	Art	Home Economics	Manual Training
Average	$2874	$2740	$3305
Akron, O.	2600	....	....
Albany, N. Y.	3200	....	2500
Atlanta, Ga.	....	....	....
Baltimore, Md.	2000	2000	2900
Birmingham, Ala.	2200	2500	2400
Boston, Mass.	....	2820	3540
Bridgeport, Conn.	2300	....	....
Cambridge, Mass.	3220	....	....
Chicago, Ill.	3750	4500	5000
Cincinnati, O.	3600	3200	3500
Cleveland, O.	3560	3560	3680
Columbus, O.	2625	2250	2250
Dallas, Tex.	3000	....	....
Dayton, O.	2050	2550	2550
Denver, Colo.	2590	2740	2940
Des Moines, Ia.	2412	2340	3400
Detroit, Mich.	4000	4000	4000
Fall River, Mass.	2880	2120	....
Houston, Tex.	2600	2100	2700
Indianapolis, Ind.	3500	2300	3500
Jersey City, N. J.	4100	4100	4100
Los Angeles, Calif.	3840	3840	3840
Milwaukee, Wis.	3840	3840	3840
Minneapolis, Minn.	2750	2500	3300
Nashville, Tenn.	1700	....	....
Newark, N. J.	2900	2900	3900
New Bedford, Mass.	2975	1850	2850
New Haven, Conn.	2750	1850	1900
New York, N. Y.	5500	5000	5500
Norfolk, Va.	1625	....	....
Oakland, Calif.	3060	3220	....
Omaha, Nebr.	2200	....	2700
Paterson, N. J.	2200	2200	2900
Philadelphia, Pa.	4510	....	4510
Pittsburgh, Pa.	4000	4000	3600
Reading, Pa.	1850	1500	2050
Richmond, Va.	1793	1793	2420
Rochester, N. Y.	3900	3600	3400
Salt Lake City, Utah	2800	2000	2600
San Antonio, Tex.	1950	....	....
Scranton, Pa.	1890	1890	....
Seattle, Wash.	3000	3660	3660
Spokane, Wash.	2550	2250	2250
Springfield, Mass.	3175	2700	....
St. Paul, Minn.	2600	2500	3500
Syracuse, N. Y.	2450	....	3600
Toledo, O.	2500	2200	3750
Trenton, N. J.	2350	2250	2900
Washington, D. C.	2740	2740	3020
Wilmington, Del.	2000	2000	....
Worcester, Mass.	3250	2000	3250
Youngstown, O.	2850	2250	2975



NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Sun Dial.

240. Q: Will you please give me directions for making the drawing of a horizontal sun dial? C. A. E.

A: The following directions for making the drawing for a sun dial taken from "The Time Piece of Shadows" by Henry Spencer Spachman. They are sufficiently complete for any manual training man to follow:

First, draw the line AB, and at right angles to it CD; then, from the point of intersection E, describe the quadrant BD, of any convenient radius. Set off on this quadrant from D toward B, marking with the dot x, the latitude of the place for which the dial is intended (in the example 40°). Draw through X, from E, the line EF, and the angle D E F will be that of the stile. Draw the line KK through CD at any convenient point, as J, parallel to AB, and as long as the paper will permit. This line is called the line of contingence, or touch line. Measure from the intersection J the least or perpendicular distance to the line EF, and set it off on the line CD, from J toward G. From the point G so found describe the semicircle H J I, with the radius JG. This is called the equinoctial circle. Draw the line HI through G and parallel to KK. Divide the semicircle HJI into twelve equal parts; place a ruler on each of these divisions and the center G; draw the lines GL and mark the points where the ruler touches the line KK; then from the center E draw through each of these points on KK the lines E5, E4, etc., which are the hour lines for the dial; AEB is always the 6 o'clock line, and CED the 12 noon lines. If the hours before 6 A. M. and after 6 P. M. are to be shown produce the lines for 7 and 8 A. M. and 4 and 5 P. M. backward through E for 7 and 8 P. M. and 4 and 5 A. M. Bound the whole with such lines as the taste may suggest, and figure the hours around the border where the lines cross. If half and quarter hours are to be shown the semicircle HG must be divided into twenty-four or forty-eight equal parts and the halves and quarters drawn through the divisions as were the hour lines. Subdivisions of five minutes may be made in the same way, but these as well as single minutes, can be accurately enough laid off around the border with the eye.

The stile must be placed directly over the 12 o'clock line, or sub-stile, CD, bending neither to the right nor left. The point of the angle starting from the centre E and opening toward the north, the upper edges forming the same angle with the dial plate as the line FF does with CD. The dial must be set in place perfectly level, with the stile line CD truly north and south. Only the hour lines should show on the finished dial, the others being erased. The stile should be either of metal or stone, wood being liable to warp. Usually, for neatness of appearance, the back of the stile is hollowed inward, but the upper edges which cast the shadow should be sharp and straight.

The following rules are applicable to all dials, and are stated here to avoid constant repetition:

1. That the line of contingence should be made as long as the paper will permit.

2. That the line of contingence is always tangent to the equinoctial circle and at right angles to the sub-stile.

3. That when half or quarter hours are to be shown the equinoctial circle must be divided into twenty-four or forty-eight equal parts and the lines drawn through these divisions as for the hours. Subdivisions of one or five minutes can be set off around the border by the eye.

4. That the hour lines only and their subdivisions need be shown on the finished dial, the others being erased.

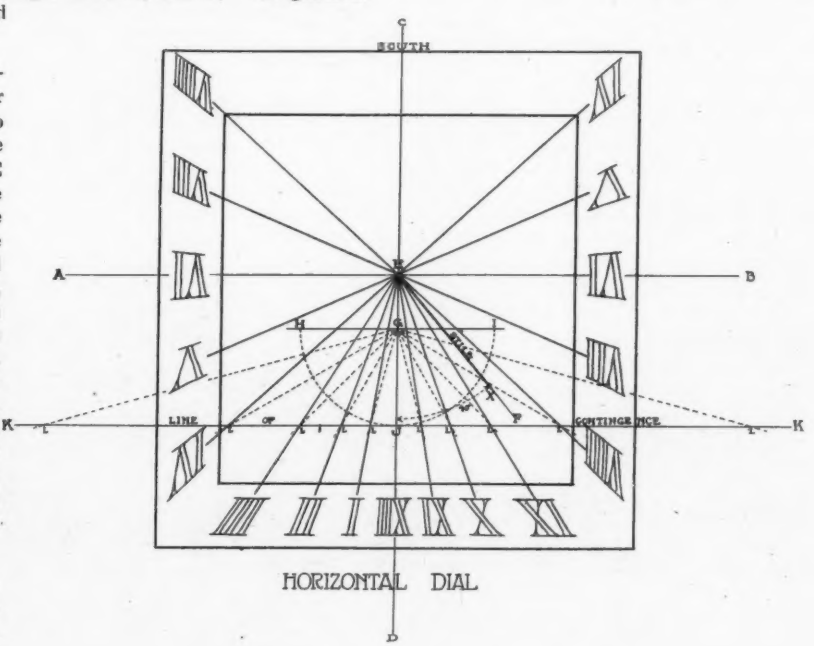
5. That the stile must be fixed on the plate at right angles—that is, bending neither to the right nor the left—and the upper edge that casts the shadow parallel to the polar axes of the earth, one end toward the north and the other toward the south pole.

6. The stile should be made either of metal or stone, wood being liable to warp. The dial plate may be of any convenient material.

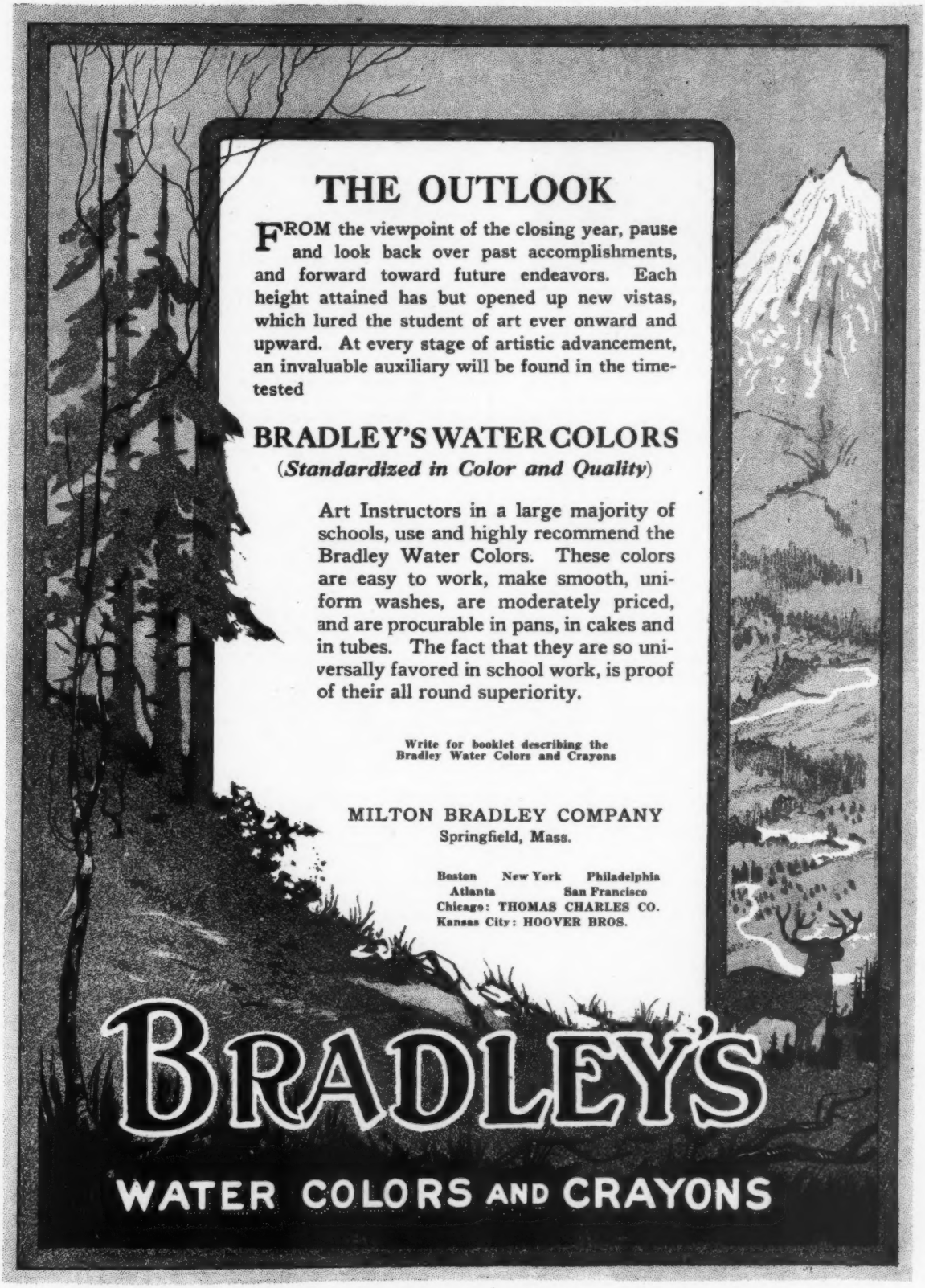
7. That all vertical dials must be set in place so that the 6 o'clock lines will be parallel to the horizon—that is level—and the 12 o'clock line is always perpendicular.

8. It will generally be found more convenient to set off the latitude with a protractor, though it can readily be done in the following manner: Divide the quadrants into nine equal parts of ten degrees each; subdividing to single degrees that only through which the latitude passes. (Ex.—To set off 47° latitude: Take the first four of 10° each=40°; then by dividing the fifth into ten parts, the remaining seven degrees are easily seen in the cut.)

9. When the thickness of the gnomen exceeds one-sixteenth of an inch there must be an allowance made for it on the dial plate; the line CD in the drawing being widened to correspond to the thickness of the gnomen, one edge casting a shadow in the morning, the other afternoon. This is most readily done by supposing the drawing cut in half through the line CD, and each edge placed against the gnomen.



HORIZONTAL DIAL


THE OUTLOOK
FROM the viewpoint of the closing year, pause and look back over past accomplishments, and forward toward future endeavors. Each height attained has but opened up new vistas, which lured the student of art ever onward and upward. At every stage of artistic advancement, an invaluable auxiliary will be found in the time-tested
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Art Instructors in a large majority of schools, use and highly recommend the Bradley Water Colors. These colors are easy to work, make smooth, uniform washes, are moderately priced, and are procurable in pans, in cakes and in tubes. The fact that they are so universally favored in school work, is proof of their all round superiority.
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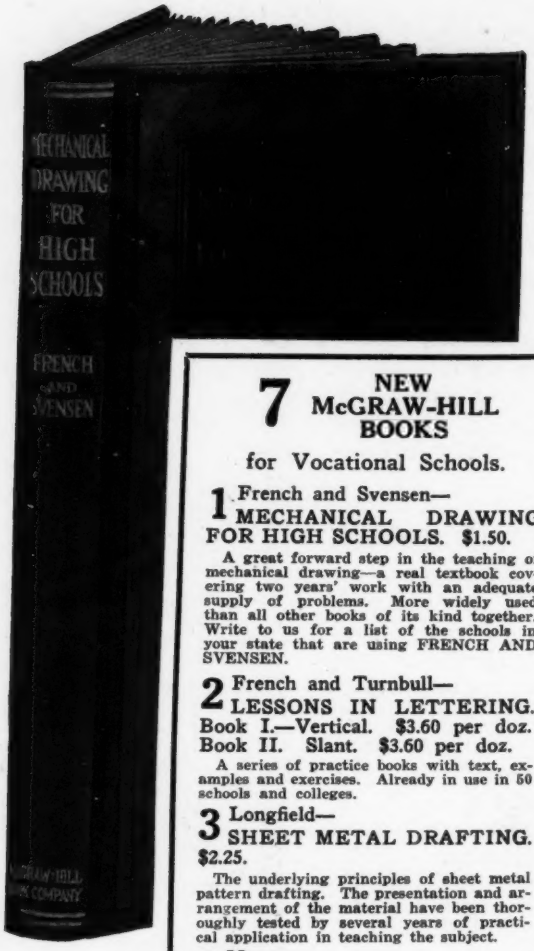

7 NEW McGRAW-HILL BOOKS

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2 French and Turnbull—
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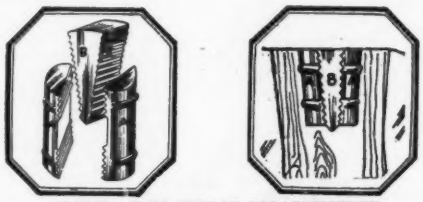
MANUFACTURERS' NEWS COLUMN

Consolidation Effective. The Boker Cutlery and Hardware Company has been consolidated with H. Boker & Co., Inc., of which it was a part prior to 1915. The consolidation brings again under one name all the interests of the old firm of Herman Boker which was established in New York City in 1837 and which has grown in scope to include large manufacturing and jobbing interests in the cutlery, steel, general metal and hardware field. The business is continued under the direction of Mr. J. R. Boker and Mr. Edward Grafmueller as heretofore.

NEW PRODUCTS.

A Safe Hammer for School Shops. A notable achievement in hammer construction is the correct designation for an improvement in the widely used Uncle Sam hammers, manufactured by the Vaughan & Bushnell Manufacturing Company, Chicago.

There has always been trouble with hammer handles working loose and the danger of the possibility of the head flying off has been considerable. The problem has never been solved adequately because of the fact that wood is subject to atmospheric changes and constantly shows a tendency to shrink causing the head of a hammer to work loose.



LEFT: THE WEDGE DISASSEMBLED.
RIGHT: THE WEDGE IN PLACE IN HAMMER HEAD.

The Vaughan & Bushnell Company has developed an expansion wedge, which will take care of all shrinkage of a hammer handle and which can always assure of a tight handle. The Vaughan Expansion Wedge can be reset by simply moving the middle section of the wedge, a notch or two deeper and driving the handle into the hammer head. The accompanying illustrations make the principle clear.

The Wedge as applied to Vaughan & Bushnell hammers, has been approved by the Underwriters' Laboratory, following a series of rigid tests, involving heat and dampness, as well as drying impact and vibration tests. Full information can be had from the Vaughan & Bushnell Manufacturing Company, Chicago.

TRADE PUBLICATIONS.

Issue a New General Catalog—The Stanley Works, New Britain, Conn., has just issued a new catalog, which contains additions to the Stanley line of Wrought Hardware as well as the older well known products. The booklet contains 375 pages, measuring 6½ x 7½ inches.

Considerable care has been taken in compiling this new catalog to give the manual training men and shop instructor as much information as possible concerning the Stanley products, such as weights, size and quantity of screws, method of packing, etc. This description will enable them to intelligently sell and recommend the various styles of butts, hinges, bolts, etc., manufactured by the Stanley Works.

A copy of this catalog will be sent to any manual training man or shop instructor.

New Prang Bulletin. The Prang Co., Chicago, has issued its 1921 issue of the Prang Bulletin. Among the helpful articles in the publication are the following:

Making Schoolrooms Beautiful. The importance of good color schemes on school walls.

Christmas Tree Ornaments. Interesting new problems in industrial art.

(Continued on Page XXIV)

"As hard as fire and water can make them"

—The Disston file-maker

Disston makes between sixteen and eighteen million files a year. Some weigh a tiny fraction of an ounce. Others 135 lbs. Some are for a lady's fingernails. Some for gigantic chunks of steel.

The supreme test of a good file is in filing the teeth of saws—steel cutting steel. And nearly a half-million Disston Files are used yearly in making Disston Saws—"the saws most carpenters use." No wonder Disston Files eat through the work in quick time! No wonder the experienced filer enjoys the feel of a Disston File as it bites into the toughest metal!

Disston Files are Disston-made from the steel to the packing case. They are of good, true steel, "as hard as fire and water can make them.'

Send for new free booklet, "The File in History."

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Bevels

Buck Saws
Butcher Saws and Blades
Circular Saws for Wood, Metal, and Slate
Compass Saws
Cross-cut Saws and Tools
Cylinder Saws

Drag Saw Blades
Files and Rasps
Grooving Saws
Gauges—Carpenters' Marking, etc.
Hack Saw Blades
Hack Saw Frames
Hand, Panel, and Rip Saws
Hedge Shears

Ice Saws
Inserted Tooth Circular Saws
Keyhole Saws
Kitchen Saws
Knives—Cane, Corn, Hedge
Knives—Circular for Cork, Cloth, Leather, Paper, etc.
Knives—Machine
Levels—Carpenters' and Masons'
Machetes
Mandrels

Milling Saws for Metal
Mitre-box Saws
Mitre Rods
One-man Cross-cut Saws
Plumbs and Levels
Plumbers' Saws
Pruning Saws
Re-saws
Saw Clamps and Filing Guides

Saw Gummers
Saw-sets
Saw Screws
Screw Drivers
Screw-slotting Saws
Segment Saws
Shingle Saws
Slate Saws—Circular
Squares—Try and Mitre

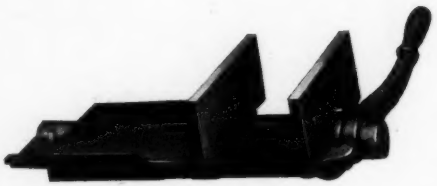
Stave Saws
Sugar Beet Knives
Swages
Tools for Repairing Saws
Tool Steel
Trowels—Brick, Plastering, Pointing, etc.
Veneering Saws
Webs—Turning and Felloe

This is a partial list. There are thousands of items in the complete Disston line.

DISSTON

SAWS TOOLS FILES

COLUMBIAN
Sledge-Tested VISES



THE time to consider carefully the kind of vises that will give best and longest service and cost least in the end, is before the vises have been bought—not after. The makers of Columbian Vises will place in the hands of supervisors and principals of vocational schools every facility for making intelligent comparative tests of metal wood-working vises of every type.

Columbian Hardware Division

of The Consolidated Iron-Steel Mfg. Co.

World's largest makers of vises and anvils.

CLEVELAND

(Continued from Page XXII)

"Ivorene Jewelry." Beautiful jewelry and art objects decorated with "Enamelac".

"Solder Paste." The magic solder for toy making, jewelry work and all soldering.

How to Make Paper Posters. How to use "Enginex" poster papers in place of water colors.

How to Use "Bateeko Dyes". The new textile craft of "Batik," "Tie-Dyeing," etc.

Manual Arts Tablets. New educational hand-work for primary grades.

How to Teach Color Scientifically. Prang "Color Charts" and "Theory and Practice of Color."

Felt Applique Work. New and interesting industrial art problems.

Pine Needle Weaving. Long-leaf southern pine needles for basketry work.

Whitford Art Tests. Art tests that will standardize your art teaching.

NEWS AND NOTES.

Donates Books and Reference Material. Mrs. H. P. Barrows, widow of the late Dr. H. P. Barrows, has recently donated to the department of agricultural education of the Oregon Agricultural College, the greater part of the books and reference material left in the department at the time of the latter's death. All of the collection, together with the library books selected personally during his residence at the College, are included in the donation.

New Department. The new agricultural department at Halfway, Baker County, Ore., was placed in operation at the opening of the school term in September. This is a union high school and comprises what is known as Pine Valley in the northern part of the county. It is an ideal location for a Smith-Hughes department, as nearly every student enrolled is directly from the farm. The vocational instructor is Mr. A. W. Wheeler.

Organize New Department. Mr. C. A. Thompson has been placed in charge of the new agricultural department in the Crook County High School at Prineville. This department offers farm shopwork and is ideally situated for work in irrigation and drainage.

High School Courses. Courses in automobile mechanics, cabinet and benchwork, farm mechanics, forging, mechanical, machine, and architectural drawing, millwork and printing are offered in the high school at Modesto, Calif.

The high school was awarded the gold medal in cabinet work at the 1921 state fair, the eleven pieces entered taking six first and four second prizes.

Manufacture Furniture. During the summer vacation, the manual training shops at Modesto, Calif., manufactured a great deal of furniture. A group of four boys, under the direction of the supervisor, make desks, filing cabinets, playground apparatus, dining tables, cafeteria tables and a mahogany roll top desk.

Extend Scope of Training. With the opening of the East High School, at Erie, Pa., in September, provision has been made for extending the scope of the trade and home making work. Trade courses are being maintained for automobile mechanics, electricians, machinists, pattern makers, printers and tailors, with a home making course of two years for girls.

Study Junior High. The Manual Arts Department at Erie, Pa., has begun an intensive study of the junior high school. Since a great deal of practical arts work is carried on in the school, it is felt that there should be a knowledge of the theory and methods of school organization which is indispensable to teachers of this work.

Prevocational Machine Shop. A prevocational machine shop has been opened at the Academy High School, Erie, Pa., with Mr. Harry L. Cotter as instructor in charge. The shop accommodates twenty students in prevocational work or in preparation for entrance to an engineering college.

The sheet metal unit trade course has recently been transferred to the Academy High School where a room 60 feet by 30 feet has been devoted to its use. Seventeen

(Continued on Page XXVI)

The School Paper

Published for the purpose of convincing educators of the educational value of printing in connection with academic and vocational instruction in public schools.

VOL. 1 JERSEY CITY, NEW JERSEY NO. 2

The Value of Schoolpapers

WHAT the newspaper is to the general community the schoolpaper is to the school community. Both possess uncommon interest to their readers by the publishing of news items and both have the power of moulding public opinion. One influences mature minds; the other influences the immature minds. Both are informative and very educational. Especially is this latter statement true as regards schoolpapers.

The schoolpaper has one distinct advantage in educational value—it is the product of its readers. To be successful it must represent the combined effort of every class in the school and be of interest to every student enrolled in those classes. The academic classes may be assigned the task of collecting news, preparing interesting articles, and revising the printers' proofs for errors in English construction, spelling and typography; the art classes may have charge of the illustrations and general typographic arrangements; the commercial classes may look after the business end of the publication, such matters as collecting money for subscriptions or advertisements, disbursements for paper, inks, etc. The actual type composition, presswork, and binding will be done by the printing classes.

PRINTING, in addition to embodying all other advantages of manual training, brings in language work—and this correlation of English and manual training is not to be had in other handwork subjects.

Surely no other school problem can combine into a single educational unity practically the entire facilities of a school as does the schoolpaper.

With the installation of printing instruction in a school the academic subjects are generally revitalized. English, grammar, spelling and mathematics take on a different meaning to students who have hitherto regarded them as necessary evils. Taught in conjunction with printing, their great value as the vital elements of education is realized.

Information: The Education Department of the American Type Founders Company employs the services of professional educators, efficiency engineers and trained salesmen to aid you in establishing printing courses in your schools. With this company the word "service" is spelled H-E-L-P.

For information write F. K. PHILLIPS, Manager, EDUCATION DEPARTMENT

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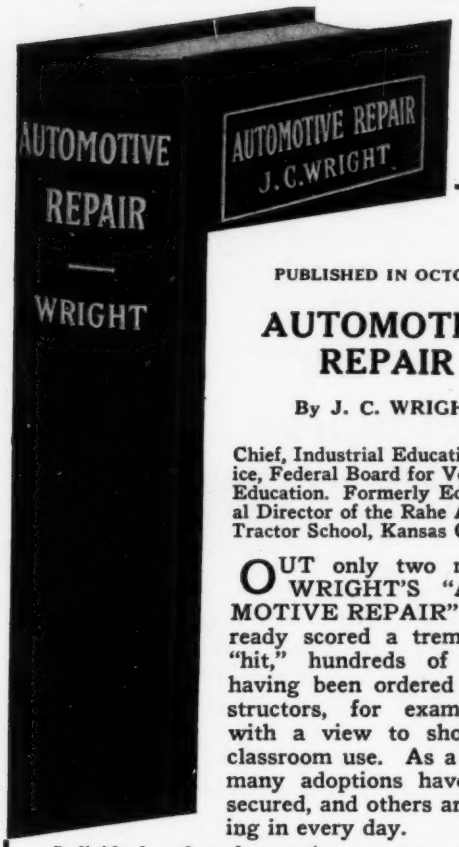
THE BODY OF THIS ADVERTISEMENT IS SET IN 10 POINT CENTURY SCHOOLBOOK, A TYPE NOTED FOR ITS LEGIBILITY WE RECOMMEND IT FOR SCHOOL USE



PUBLISHED IN OCTOBER

AUTOMOTIVE REPAIR

By J. C. WRIGHT

Chief, Industrial Education Service, Federal Board for Vocational Education. Formerly Educational Director of the Rahe Auto and Tractor School, Kansas City, Mo.

OUT only two months, WRIGHT'S "AUTOMOTIVE REPAIR" has already scored a tremendous "hit," hundreds of copies having been ordered by instructors, for examination with a view to shop and classroom use. As a result, many adoptions have been secured, and others are coming in every day.

Individual orders from private owners of automobiles and general repairmen, also indicate a widespread appreciation of the practical assistance "Wright" gives in the performing of 118 everyday repair jobs.

530 pages. 6 by 9. Profusely illustrated.
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Oxy-Acetylene Welding Manual

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IAM 12-21

(Continued from Page XXIV)

boys have been admitted to the first year of the course.

Ten men have been appointed from the trades as instructors in shopwork for this year. Their shop experience varies from three to twenty years of journeyman and foreman service. A teacher-training class is maintained each Wednesday evening to impart the methods of teaching. Eighteen men from the trades in the city have been admitted to the class in addition to those employed as teachers. Mr. E. L. Bowman is instructor of the class, which is maintained as an extension branch of the University of Pittsburgh Teacher Training Course under Mr. A. S. Hurrell.

Enlarged Department. The Manual training department, of the Dyersburg, Tenn., high school has been enlarged since last year. The wood working and machine rooms now have separate floor space of sufficiently large size for the purpose. There is also an exhibit room and a lumber storage room. The number of pupils has increased from 28 last year to sixty for the current year.

War orphans and other needy children of France are made self-supporting and at the same time restored to health at the Pittsburgh Farm School at Fontaineroux, France.

This school was established through the donation of $42,000 by the public school children of Pittsburgh. The Pittsburgh Red Cross has appropriated $15,000 to aid in the erection of dormitories for the housing of the sixty children enrolled. A three-year course in agriculture is offered.

Supervised Vocational Agriculture. Supervised teaching in vocational agricultural courses at the Iowa State College is being carried on in three consolidated schools, all within ten miles of the college. The school boards of the three schools have entered into a cooperative arrangement under which they rotate in equipment and instruction. In this way, a three years' program is provided but the work is carried on by a specialist. The work is unified by the head of the Department of Vocational Education of the College, who selects the instructors and is responsible for the character of the work.

Double Sessions for Wage-Earners. The high school session at Marietta, O., begins at 7:30 A. M., offering opportunity to many pupils to work half a day and still keep up with their studies. The session lasts until 11:30 o'clock. About half the boys and one-fourth of the girls in the school have taken advantage of the plan. Some pupils earn from $1.50 to $2.10 a day and keep up with all their school work.

Reorganization of Home Economics. The home economics courses in the Oregon Agricultural College have been reorganized and are now divided into five departments, each with an administrative head. Special laboratories for weaving, dyeing, laundry work, etc., are included in the equipment and the dining rooms and kitchens serve three hundred persons. Two sets of rooms are fitted up to show effective equipment of a kitchen, dining room, and living room suitable to a low family income and to a moderate income respectively.

Working Children Attend School. Continuation schools for children who leave school to go to work are among the aims of the National Child Labor Committee. Under the continuation school system, as recommended by the committee, children who go to work before they are 18, would be required to attend school for at least eight hours a week until they reach that age.

According to the Bureau of Education, the average child who leaves school with a working permit at the age of 14 or 15, has only a rudiamentary education. He increases the competition in the labor market and has no mental training or equipment to help him advance to the higher position.

The National Child Labor Committee, in its present campaign, aims to bring the American public to a realization of the value of child education as an economic factor. This can be brought about through the cooperation of the employer, the parent and the child.

(Continued on Page XXIX)

(Continued from Page XXVI)

Manual Arts in Junior High. At Huntington, W. Va., the Junior High School Plan is followed and in each of the five schools, there are courses in woodwork, mechanical drawing and sheet metal work. The senior high school is equipped with the best machinery and tools and courses in printing, mechanical drawing, machine drawing and architectural drawing, blacksmithing, machineshop practice, woodwork, millwork, benchwork in carpentry, pattern making and furniture construction are offered.

A feature of the manual arts work is the requirement that students do one-half year of repair or new equipment work for the schools, and that they spend the remainder of the year in elective work, either for themseleves or for the schools.

A complete record of all the manual arts work is kept in the supervisor's office and is accessible at all times. Credits are given for all work completed.

The excellent character of the work done may be ascertained when it is stated that one student left to take a drafting position at a salary of $1,800 and made good in the work.

Open Evening Classes. Evening courses in machine shop practice, trade drawing, industrial mathematics and preparatory mathematics, mathematics for electricians and heat treatment of steel have been formed at Waltham, Mass. The courses will continue for forty nights and will be in charge of the director of continuation work.

Lectures on Period Furniture. The Pennsylvania Museum and School of Industrial Art, at Philadelphia, has announced a series of lectures on period furniture, to be given by Mr. Edward Warwick. The lectures will run from October through April and will cover styles in England from the Gothic to the Sheraton periods, in France from Louis XIV through the Empire and in Italy the period of the Renaissance.

Illustrated Lectures on Decorative Forms. The Pennsylvania Museum and School of Industrial Arts is offering a course of illustrated lectures on the subject of the evolution of ornamental motives, by Huger Elliott, principal of the school. The outline covers such topics as reason for ornament, a survey of general history, motives of the various periods, sources, and present day problems in historic ornament.

New Industrial Courses. The industrial department of the Fargo, N. D., schools has been enlarged by several new courses. In the senior high school, the work in the wood shop covers three years and includes elementary woodwork, machine shop practice, carpentry, upholstering, wood finishing and concrete work. Mr. O. C. Hill is in charge of this work.

The metal shop offers two years of work, beginning with elementary machine shop practice and elementary automobile mechanics. Mr. H. A. Sevey has charge of the shop in addition to classes in mechanical drawing and machine drawing.

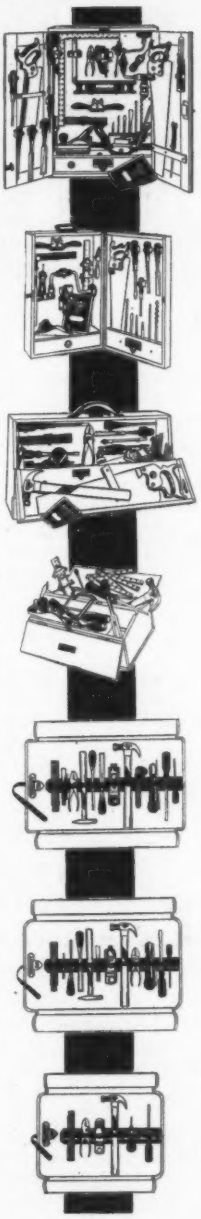
Printing is offered during two full years, the courses being designated as printing one and printing two. Mr. R. H. Carrington is instructor.

In the junior high schools, the woodwork and drawing are handled by Mr. F. Frederickson and Mr. Carl Foslin. Benchwork is offered in the seventh, eighth and ninth grades. Mr. C. H. Kimball is head of the industrial department.

New Vocational School. Eureka, Calif., is spending about $35,000 this year on the vocational department of the high school, $25,000 for a building and the balance for new equipment. The building is to be of the factory type, two stories in height, with walls of concrete and floors of slow-burning mill construction.

An initial equipment of machines and tools for a class of ten has been provided for. Machines will be driven from a line shaft and those that require a belt will be of the gear-box drive type so that shifting of belts will be eliminated.

The work of placing wires for light and power, and the installation of equipment is being done by the students of the school.



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A fine example of the new Stanley Tool Cabinets is the No. 850, illustrated above. See the entire line at your hardware dealer's today.

Illustrated folders (16L) gladly sent on request.

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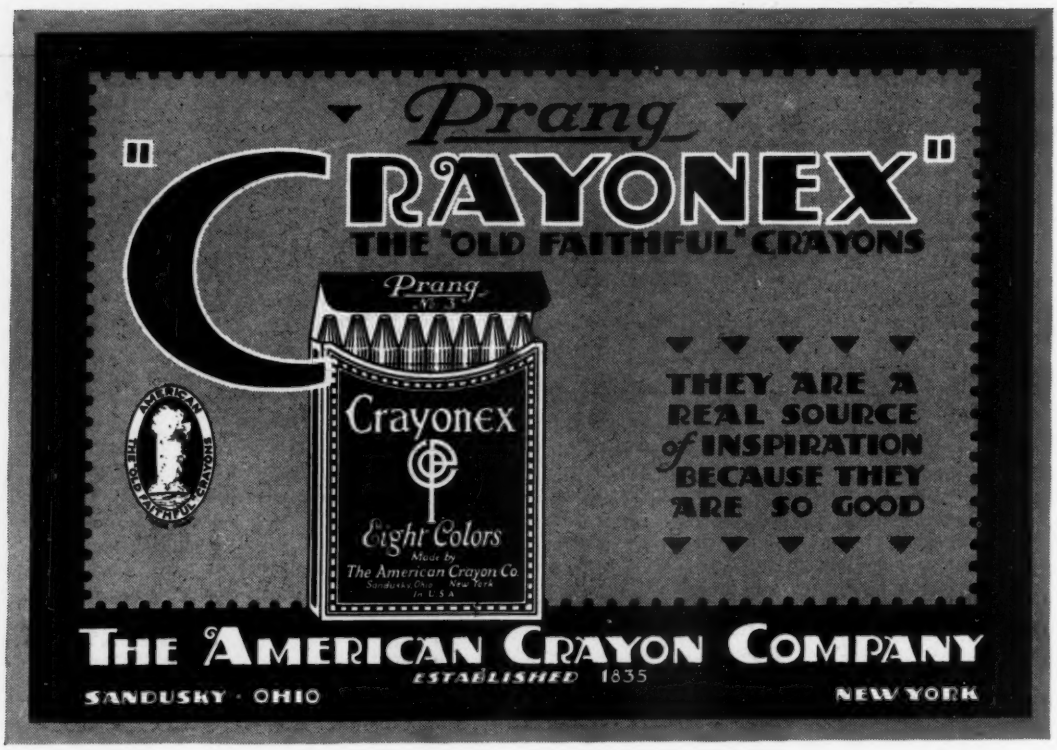

The school is very much crowded owing to a large enrollment of students. The mechanical department enrolls 108 students, the wood working shop 70, and the machine and automobile course 40. Mr. J. E. Doren acts as supervisor of the vocational work.

Art Attracts Boys. More boys selected art courses in the schools of Cleveland, O., this year than ever before, according to the supervisor. Where formerly one boy was found in the art classes, there are now five or six and even more. In one school, an entire class of boys has selected art in the ninth grade.

Leather Course. A practical course in leather work, embracing shoe making and repairing, and making of leather articles is being offered at Los Angeles, Calif. The course covers two years of two semesters each, with five months' work in each semester.

Mechanics Arts Department Remodeled. The Mechanics Arts Department at Reno, Nev., has been remodeled by the boys of the advanced class, under the direction of the instructor.

The night classes in shop and mechanical drawing, which opened on September 26th, with an increased enrollment, indicates another successful year.

The art department, under the direction of the supervisor is doing some excellent poster work in the direction of advertising school activities.

Mr. G. Levant Thompson acts as supervisor of the manual arts department.

Coordination Department. A department of coordination has been established in the vocational department at Buffalo, N. Y., under the direction of Mr. F. H. Wing. The department seeks to bring the industries and the schools in closer touch in order that boys trained in the schools may find places in the industries in trades for which they are trained.

It is planned to secure positions for boys before they finish their courses. Apprenticeship agreements and wage conditions are being worked out for each of the trades, and a splendid spirit of cooperation has been manifested on the part of the industrial concerns of the city.

A follow-up plan will be carried on in connection with the boys who are placed in the industries. The evening schools offer more advanced courses to the graduate groups and there is a consistent effort being made for better workers in the industries.

The American Federation of Arts, New York and Washington, has issued a special catalog of its recent exhibit of prints in color and photographs for school and library decoration. The exhibit which was especially adapted in size and subject for school purposes, included about 130 subjects ranging in price from $4 to $25 each. The subjects are the work of fifteen different publishing houses and artists.

The list of subjects which has been arranged by number, artist, title and price, includes wood block prints, sepia work, copper plate facsimile color prints, colored photographs, copley prints, thistle carbon prints, lithographs in color, riviere prints, and hand colored photographs. The list of artists includes Millet, St. Gaudens, Whistler, Homer, Vandyck, Rembrandt, Raphael, Titan and lesser artists.

The prints offer material for the cultivation of ideals and ambitions of pupils, as well as bringing into the lives of children that shadowy thing called culture.

An amendment of the compulsory continuation school law whereby a boy may attend the evening schools instead of the day school is recommended by Arthur S. Somers of the New York City School Board.

Battle Creek, Mich. The board of education is erecting a new vocational school building to include the industrial, home economics and commercial departments of the high school. Mr. G. G. Price is in charge of the entire vocational work of the city.

Endow School. The public schools of McComb, Miss., have received a gift of nearly half a million dollars for the establishment and permanent endowment of a vocational high school for the city. The school is the gift of Mr. William McColgan, a millionaire philanthropist, who has directed that $150,000 of the fund be used for the erection

(Continued on Page XXXIII)

Make It A "Merry Christmas"

Why not give your pupils an opportunity to apply their decorative designs on articles that make beautiful holiday gifts? Here are five Suggestions.

Decorate Boxes and Trays

Children love to make Useful things Beautiful. Wooden and tin boxes when decorated with "Enamelac" and lined with cloth make beautiful jewel boxes, sewing boxes, etc. Old olive bottles, or any glass jar of good shape, becomes an atractive flower vase when decorated with "Enamelac." We supply a nest of five round wooden boxes for decorating at $1.50 per nest.

Illustrated circular free

Decorate "Permodello" Jewelry

Do you know "Permodello," the new Modeling Clay that "sets" like conconcrete? It makes beads, pendants, hatpins and all kinds of jewelry which are then decorated with "Enamelac." We publish a book on "Permodello Modelling at $1.60 postpaid.

"Permodello" clay in one pound cans .....60 cents

Decorate "Ivorene" Jewelry

"Ivorene" is the newest material for work in Decorative Design. It looks like ivory, but comes in sheet form. It can be cut with a sharp knife or a coping saw. It takes "Enamelac" decoration and makes Pendants, paper cutters, book marks, tags, and many other practical articles. Per sheet 4"x5", 30 cents; 5"x10", 75 cents. Also cut larger sizes.

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Decorate "Ivorene Novelties"

We can supply a line of eight "Ivorene Novelties" ready for decoration with "Enamelac." Your pupils will delight in making designs for, and decorating these novelties that make artistic and useful gifts. Square mirror, $2.00 per doz.; Pen Wiper, $1.60 per doz.; Memo. Book, $2.00 per doz.; Circular Mirror (2½ in. diam), $4.00 per doz.; Mirror (3¼ in. diam.), $5.50 per doz.; Vanity Case, $4.50 per doz.; Tape Measure, $3.00 per doz.; Signature Blotter, $2.00 per doz. Send for illustrated circular.

"Dekko" Board— *For All Decorative and Construction Work*

This is a new Composition Board for making Toys, Table Mats, Boxes, Waste Baskets and other Novelties. Takes decoration with "Enamelac." Ready cut circles for Table Mats. This new and inexpensive Board will solve many of your hand-work and construction problems. Send for sizes, prices and samples.

Have you seen the new issue of "The Prang Bulletin?"

THE PRANG CO., 1922 CALUMET AVE., CHICAGO :: 30 IRVING PLACE, NEW YORK

(Continued from Page XXX)

and equipment of the building and $250,000 for the endowment of the school.

In providing for the erection of the school, it was the purpose of Mr. McColgan to meet the needs of boys who may not be interested in the purely literary courses leading to the professions, but who are mechanically inclined. The new school will provide the technical training which such boys need for following a trade in the industrial shop.

Oakland Gets Largest Share of Federal Fund. The city of Oakland heads the list of cities in California in the amount of money allotted to the schools for stimulating trade and vocational education in Smith-Hughes classes, receiving the amount of $28,249. Other cities receiving smaller amounts were Berkeley, San Francisco and Los Angeles. Smith-Hughes classes are conducted in eleven schools, where a consistent development of vocational education is fostered to meet the trade and commercial prosperity which the future promises.

The cafeteria of the Sandpoint, Ida., high school is in charge of the class in household management. A member of the class acts as manager each week and pupils of the upper grade cooking classes prepare the meals. The cafeteria is self-supporting. The arrangement gives the high school class practical experience in management and affords a real point of service for the grade cooking class.

Mr. W. N. Brown, principal of the Manual Training High School, Peoria, Ill., has resigned.

Miss Mary B. W. Coxe, teacher of art in the Rhode Island School of Design, died suddenly October 16th.

Manhasset, N. Y. The principal has formed a cabinet, consisting of a group of teachers, to advise with him in formulating school policies.

Vocational Building. Construction work has been begun on a new vocational building at West Plains, Mo. The building will cost $10,000.

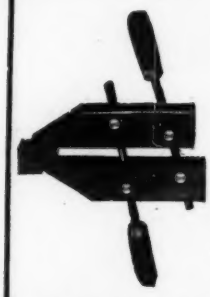
Prepare Pupils for Shoe Industry. The board of education of New York City is offering during the fall term, a day course in the manufacture of boots and shoes. The course is free to any pupil over 14 years of age who is an elementary school graduate. The course is practical in scope and includes a thorough knowledge of boot and shoe manufacture. The work is being offered at the Brooklyn Vocational School, of which Mr. James Allen is principal.

Minneapolis Technical School. The former girls' vocational high school, at Minneapolis, has recently been reorganized as a vocational school for boys and girls. During the fall, boys were for the first time admitted to the school. The courses for boys comprise telegraphy, shorthand and typewriting and other general commercial subjects.

The board of superintendents of New York City has recommended the erection of a vocational school for the Bronx. The building will house two schools, one for boys and one for girls, the former to be devoted to boys' work and to contain shops for machine shop work, forging, foundry work, sheet metal, woodwork, printing, electric wiring, freehand and trade drawing. Provision will also be made for training connected with the household. The estimated capacity of the building is 700 for the boys' section and 650 for the girls' section.

New York, N. Y. The board of education has accepted a gift of $14,000 in Liberty Bonds given by the sons of Mrs. Rebecca Elsberg for the establishment of the Rebecca Elsberg Memorial Scholarship Fund. Under the arrangement made by the donors, four prize scholarships will be awarded each year to public school pupils. One prize will go to a boy and one to a girl graduating in each half year from an elementary school in the territory embraced in the Borough of Manhattan.

Each recipient is also given an engraved certificate, signed by the superintendent, which certifies that one of the scholarship prizes has been awarded for honorable character, conduct and record and proficiency in studies. The value of each prize will amount to about $150.



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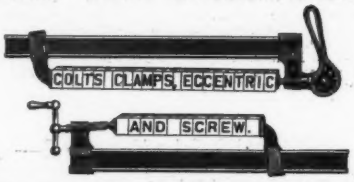

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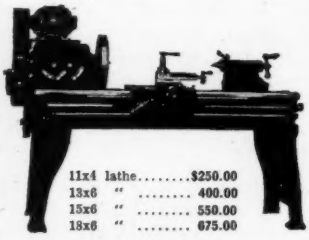

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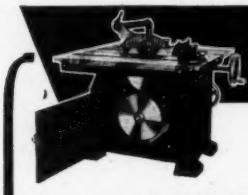

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Our type "B" double arbor saw bench was designed for pattern shop work where frequent setting up is the rule. It is therefore the only logical saw for your shop.

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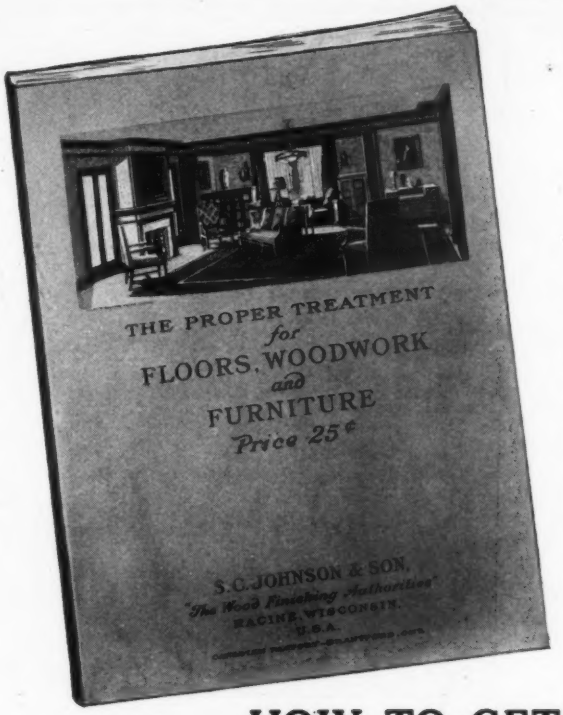

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Johnson's Artistic Wood Finishes are particularly adapted for manual training work as they may be applied by the youngest and most inexperienced pupils with good results. Johnson's Artistic Wood Finishes are standard for manual training as they are being used all over the United States and Canada for this purpose.

The perfection of Johnson's Artistic Wood Finishes has been the work of years. You get the benefit of our experience—of our money expenditure—of our knowledge of woods. Our plant is equipped with the best up-to-date mills and machinery and every department is in the hands of experts.

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You will find this entire line described in our book. Any time specific information is desired, or whenever you want specially finished wood panels, do not hesitate to write us. We solicit correspondence with Manual Training Instructors.

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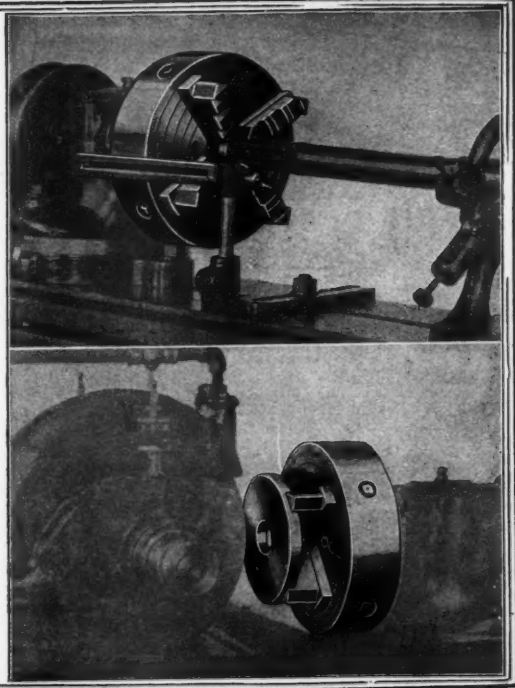

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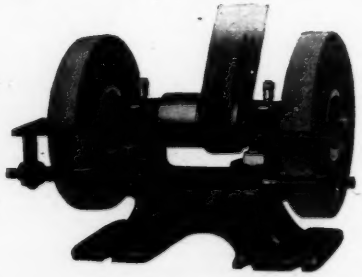

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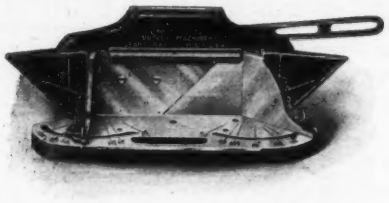

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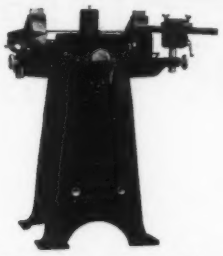

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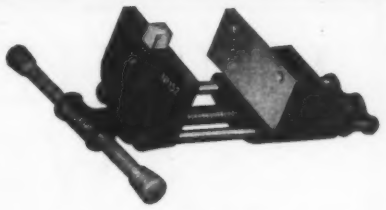
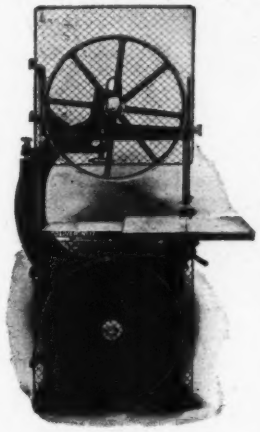


"Oliver" No. 152 Wood Worker's Vise.



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Your particular attention is called to the "Oliver" 15-Inch Disk Sander here illustrated. It is made for attachment to your electric light circuit—whatever the current.

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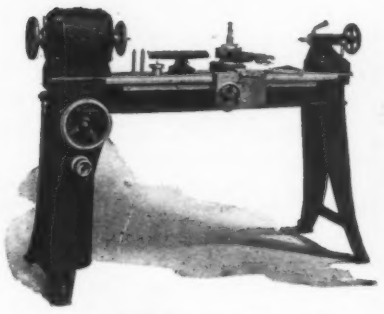

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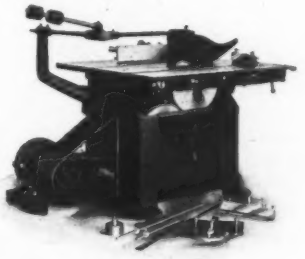

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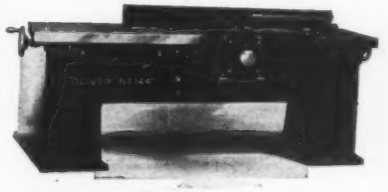
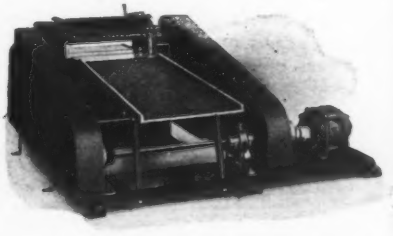


'Oliver" No. 166 Hand Planer and Jointer.

No. 182—15-Inch Disk Sander.



Rear View "Oliver" No. 99 Surface Planer.

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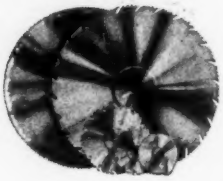
Backed by an experience of more than 50 years in successful saw manufacturing, Huther Saws can be depended upon for their accuracy, durability and freedom from flaw.

HUTHER BROTHERS DADO HEAD

To facilitate intricate cutting and grooving. Consists of two outside cutters, and enough inside cutters to perform the required operation. Outside cutters can be used singly or in pairs as desired. May be obtained in many different sizes. We were the original patentees of this type of saw.

HUTHER BROTHERS HOLLOW GROUND SAWS



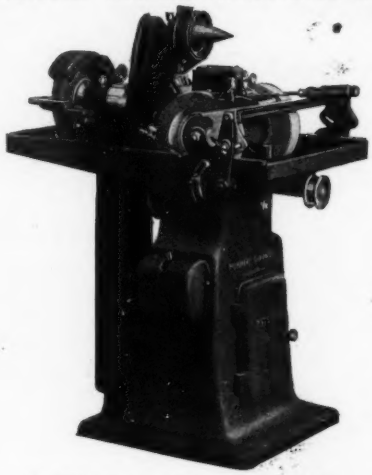
These saws are noted for the accuracy with which they are ground. Free cutting that leaves a smooth even surface. Now being used by hundreds of woodworkers, furniture manufacturers and cabinet makers.

Write for illustrated catalogue describing these and all other Huther Saws. Order the size you prefer by return mail and return if not satisfactory.

Huther Bros. Saw Mfg. Co.
Rochester, N.Y.

MUMMERT-DIXON OILSTONE GRINDERS

The Modern Edge Tool Sharpening Machines
THE STANDARD FOR ALL INDUSTRIAL SCHOOLS



No. 481—Motor or Countershaft Drive.

An automatic attachment for grinding long knives can be furnished with this machine.

THE FIVE LEADING FEATURES

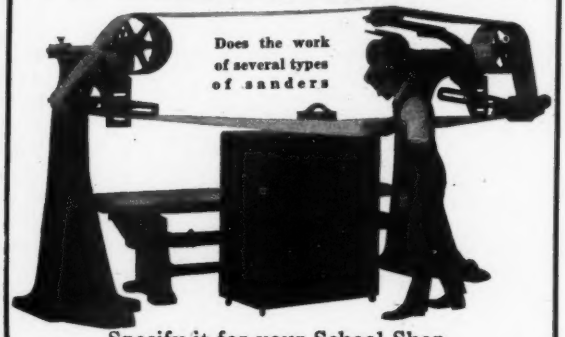
1. Coarse Oilstone Wheel
2. Fine Oilstone Wheel
3. Grinding Cone
4. Leather Wheel
5. Emery Wheel

ALL AT YOUR FINGERS' ENDS

Send for full descriptive bulletin

MUMMERT-DIXON CO.
Hanover, Pa.

MATTISON
Universal Sanding Machine



Specify it for your School Shop.

Because this Open End Sander occupies small floor space and handles finishing jobs which would otherwise require several types of sanders, it is of special value for School Work.
Belt may be elevated to any level from table position to five feet from floor for chests, cabinets, etc.
Long pieces may project out over table beyond bases. Small shaped work is quickly finished against roll, platen or special form at left end.

Bulletin 134 is yours for the asking.

MATTISON MACHINE WORKS
Main Office and Works:—Rockford, Illinois

Branch Sales Offices:
NEW YORK SAN FRANCISCO CHICAGO GREENSBORO N.C.

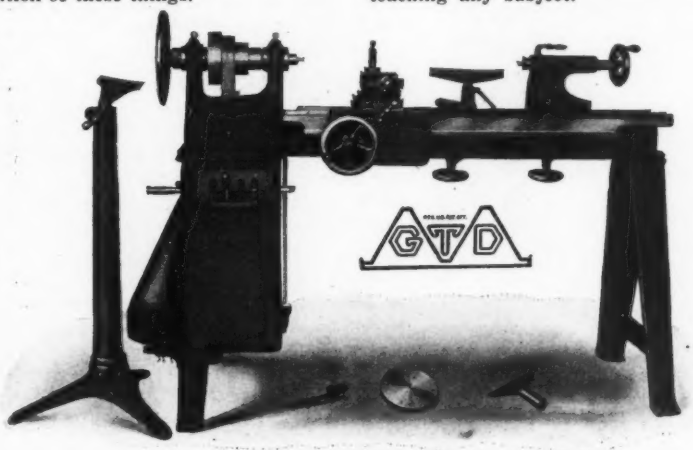
Sales Representatives for New England:
Baxter D. Whitney & Son, Winchendon, Mass.

TEACHING THE NEXT GENERATION

Finest of all workmen is the craftsman who seasons his work with romance and into the products of his hands puts originality and thought. He is called a genius. But his ingenuity is acquired by hard work and clear thinking.

Every boy in your classes is a possible genius. You can help to make each one appreciative of useful and beautiful things and at the same time teach him manual skill without which there can be no appreciation of these things.

One of the oldest and best methods involves the making of original designs on the "Wells" Manual Training Lathe. Let each boy keep what he makes; an inlaid nut bowl for mother,—a tobacco humidor for father, a baseball bat for himself and for the best girl a pair of mahogany candlesticks. (They'll think of a hundred and one things.) Encourage them to use their imaginations. You'll find them enthusiastic over the work. And that after all is of the utmost importance in teaching any subject.



NO. 218 "WELLS" MANUAL TRAINING LATHE

NO. 218 "WELLS" MANUAL TRAINING LATHE possesses features which make it exceptionally desirable for boys' training classes. It operates like a regular lathe—(It is one). It is safe;—motor enclosed—driven cone protected—belt shifted by "single handle control." It is durable;—adjustable taper bronze ring-oiling bearings. It is accurate;—headstock and bed cast integrally. It is adaptable;—turns wood or metal.

If you are interested or in any way responsible for the purchase, use or maintainance of vocational equipment, you should sign and mail the coupon, now, while you intend to do it.

MACHINE TOOL DIVISION

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS

GTD Corporation, Greenfield, Mass.
Please send me data sheets and circulars describing
"Wells" Manual Training Lathes.
GTD Repair Tools.
"How I Fixed It"—200 Repair Stories.
Chart showing tap-drill sizes.

Name .....
Position .....
School .....
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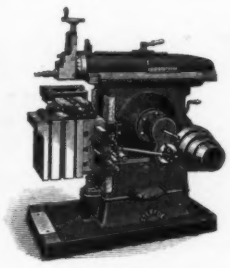
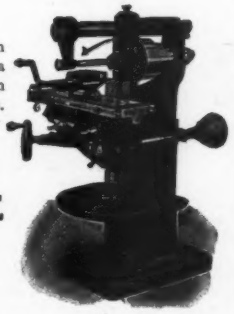
IA 612



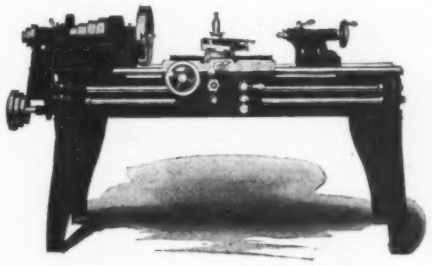
Steptoe Shapers and Millers

Steptoe Shapers and Millers are used in a large number of school shops because they are easy to operate and practically fool proof.

Send for our catalogue and learn more about the machines built by a firm with 75 years of experience in the manufacture of high grade tools.



THE JOHN STEPTOE COMPANY
Industrial Education Department
CINCINNATI — OHIO



14"x6' $400.00
16"x6' $450.00
Add $40.00 for every 2 ft. additional of bed. Prices F.O.B. Factory.

Complicated Machinery

is not adapted for school work.

"STANDARD" Engine Lathes

are of simple design, combining accuracy with the highest quality of workmanship and materials.

Send for descriptive matter of this medium price machine which has been especially designed for school work.

"Quality Without Frills"

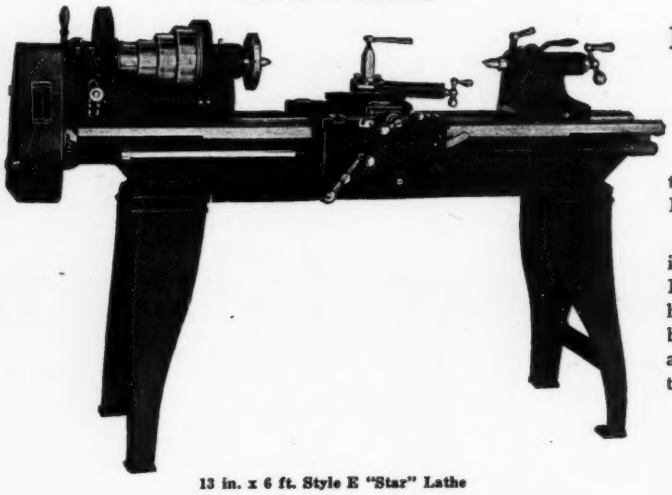
Sizes 14" — 16" — 18" — 20"

The Standard Lathe Works

2951-61 Colerain Avenue CINCINNATI — OHIO

"STAR" Screw Cutting Engine LATHES

9—11—13—15 inch Swing



13 in. x 6 ft. Style E "Star" Lathe

Do you graduate

MASTER CRAFTSMEN

or—

MECHANICS?

Is your School properly equipped to train the Student of today to become the Master Craftsman of tomorrow?

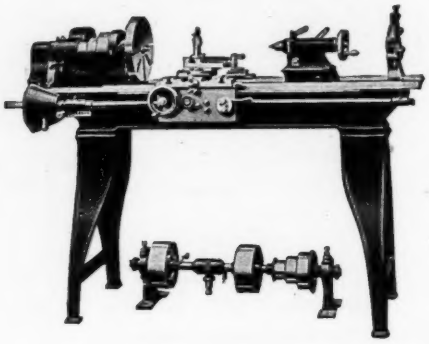
Every "STAR" lathe is a real mechanical achievement, designed and built by Master Craftsmen — that is why they have been selected as standard equipment by over Two Hundred Training Schools and Technical Institutions for educational purposes.

When preparing your specifications write us for YOUR copy of our catalogue and list of prominent installations.

THE SENECA FALLS MFG. CO., INC.

346 Fall Street, SENECA FALLS, N. Y., U. S. A.

SHEPARD LATHES



THE NEW SHEPARD

12" Cone Head Semi-Quick Change Screw Cutting Engine Lathe with Countershaft. (Also furnished with Gap Bed.)

A lathe that is properly designed, well built, durable and accurate. One that is guaranteed to insure complete satisfaction in the many varied fields to which it is adapted. It is the ideal lathe for the school shop.

DESCRIPTIVE LITERATURE ON REQUEST

SHEPARD LATHE COMPANY

RISING SUN, INDIANA

HARGRAVE

QUALITY TOOLS

PERFECTION CLAMP

Our PERFECTION CLAMP was the first steel bar Clamp upon the market and improvements from time to time have kept it the best. The bar is high carbon manganese steel, very strong. The screw has deep cut Acme thread with long bearing, giving great power and insuring long life.

CARRIAGE CLAMP QUICK CLAMP

Send for catalog showing our complete line. A Clamp for every purpose and many other useful tools.

Ask your dealer for HARGRAVE QUALITY TOOLS

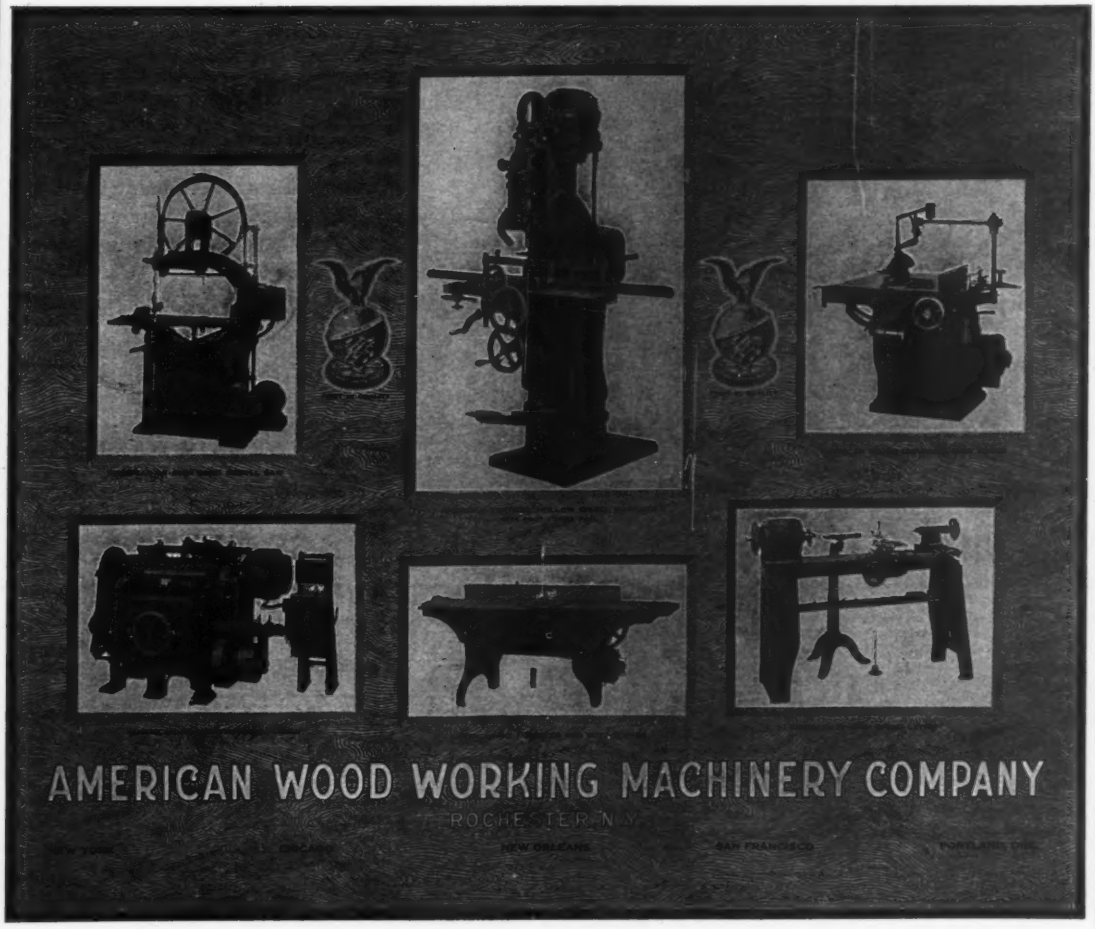
THE CINCINNATI TOOL CO.

Established 1879
Incorporated 1884

Waverley Ave. and C. L. & N. Ry.
CINCINNATI, OHIO

THIS GROUP OF SIX AMERICAN WOOD WORKING MACHINES

compose the principal ones in the equipment
of a woodworking department.



Actual Size 20" x 24"

36" Band Saw—Hollow Chisel Mortiser—Universal Saw—Single Surfacer—
Hand Jointer—12" Speed Lathe.

We have arranged this group for framing. It is printed in three colors. Your boys can make a frame for it as a part of their work. It makes a fine picture to hang on the walls of your workshop.

LET US SEND YOU ONE.

Sent free of charge to any teacher.

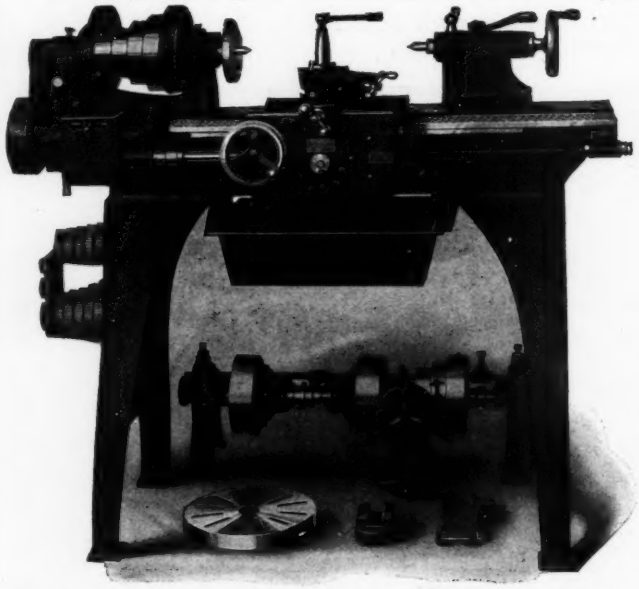
AMERICAN WOOD WORKING MACHINERY CO.

ROCHESTER, N. Y.

AMERICAN WOOD WORKING MACHINES FOR VOCATIONAL SCHOOLS.

WORCESTER LATHES

RELIABLE | ACCURATE | DURABLE | ECONOMICAL

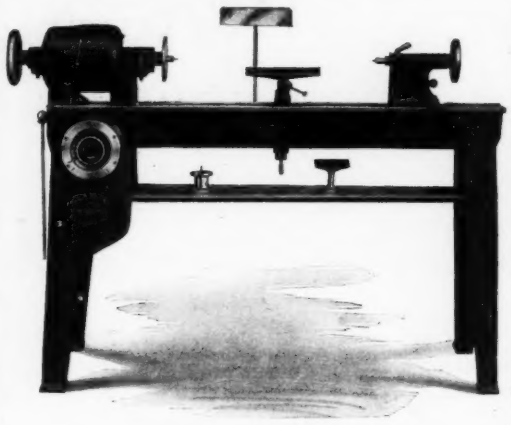


This cut shows one of ten WORCESTER 12" x 4' S. Q. C. Lathes recently furnished to the Chicago School Board as equipment for the machine shop of the Lane Technical High School.

Besides standard equipment these machines included the following new features:—Gear Rack, Shearing Pin on Lead Screw, Thread Chasing Dial, Bronze Bearings and Detachable Steel Chip Pan.

WRITE FOR CIRCULARS
OF THE NEW
"WORCESTER QUICK CHANGE LATHE"

WORCESTER LATHE CO., WORCESTER, MASS.

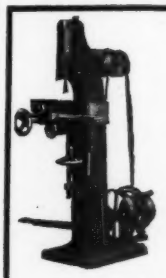


Motor Headstock Lathes

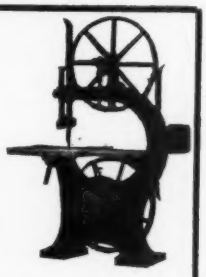
This is the highest development in Manual Training School Equipment. We build Lathes of this type suitable for either DC or AC Current. Motors are ball bearing and have convenient speed regulating dials and snap switches. Convenient to operate and every provision made to avoid injury to operator or motor.

We build a complete line of Manual Training Equipment and have a special catalogue which will be sent on request.

Hall & Brown Wood Working Machine Co.
Broadway, Tyler, Ninth Streets,
ST LOUIS, U. S. A.



Crescent Wood Working Machines

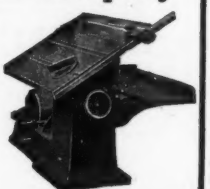


are bought extensively by men who first used them in Manual Training Classes. They choose CRESCENT because the unchangeable goodness of the machines was thoroughly impressed upon them in the Schoolroom. Give your students a chance to know CRESCENT quality.

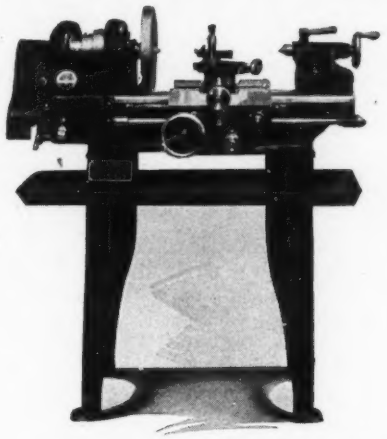
Send for catalog of band saws, jointers, saw tables, shapers, variety wood workers, planers, planers and matchers, cut off saws, disk grinder, borers, hollow chisel mortiser, Universal wood workers.

The Crescent Machine Company

25 Main St., Leetonia, Ohio



MONARCH JUNIOR LATHES



THE BIGGEST LITTLE LATHE BUILT

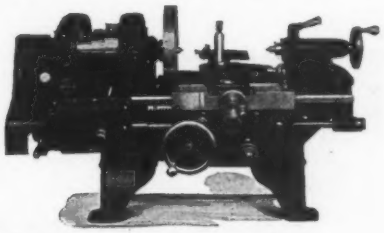
A sturdy small engine lathe complete in every detail, built with the same quality construction that has made MONARCH ENGINE LATHES standard the world over.

An accurate, dependable machine tool especially designed for and guaranteed to do with speed and accuracy any small work that any other large or small lathe will do.

THE IDEAL LATHE FOR INSTRUCTION PURPOSES

The Monarch Junior Lathe is ideal for instruction purposes. Economical of operation—compact—requiring only about one-fourth the space necessary for ordinary lathes. It is easy to operate and is practically fool proof—a wonderful combination for the student.
Monarch Junior Lathes are built in two sizes—9-inch swing and 11-inch swing with bed lengths from 2½ to 5 feet. Any size is mounted on bench or floor legs as desired—and every one is guaranteed to give satisfaction to the purchaser.

This Company, recognizing the future value of the use of Monarch Lathes for instruction purposes allow a liberal discount on Monarch Lathes to educational institutions. Write us for full information, prices, etc.



A FREE BOOKLET—We have prepared a special booklet—Monarch Engine Lathes for Vocational Schools. It details the many features that make Monarch the standard Lathe for Vocational Training Equipment and shows photographs of some of our many school installations.

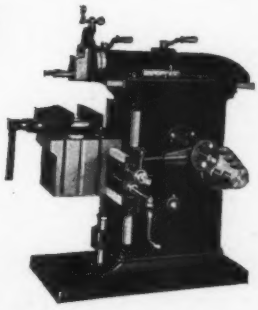
The Monarch Machine Tool Co.

204 Oak Street SIDNEY, OHIO

WHIPP SHAPERS

A NEW SIZE
FOR
INDUSTRIAL SCHOOLS

A 12″ SHAPER with 14″ STROKE built to the same standards of accuracy and workmanship as the larger sizes of WHIPP SHAPERS.



EVERY INDUSTRIAL AND MANUAL TRAINING SCHOOL having a machine shop can now have a shaper at such a

LOW FIRST COST

that you cannot afford to carry on your work without one.

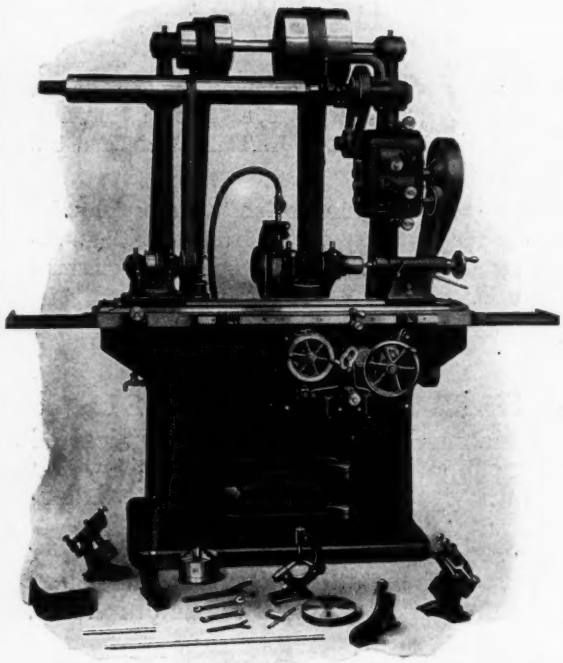
Send for Bulletin 25

Schools requiring both a PLANER and a SHAPER will be interested in our 26″ Combined OPEN SIDE CRANK PLANER and SHAPER.

Send for Bulletin 26

THE WHIPP MACHINE TOOL CO., SIDNEY, OHIO.

FRASER SELF-CONTAINED UNIVERSAL GRINDER



The Fraser Patented Shockless Reverse allows you to work with very close limits up to a shoulder without reducing the table speed.

For rapid and accurate grinding the Fraser is unexcelled.

There are 8 table speeds and 8 work speeds obtainable through quick change gear boxes.

Four Sizes: 10 x 30 in., 12 x 30 in., 10 x 40 in., 12 x 40 in.

Warren F. Fraser Co.
Westboro, Mass.

Always Efficient Work When You Use "INTERNATIONAL" Electric Glue Heaters

—because the glue is always at the correct temperature for greatest tensile strength. The fireless cooker principle of the International Electric Glue Heater means that glue is always ready for use—current consumption is low. Made in sizes from one pint to 50 gallons.

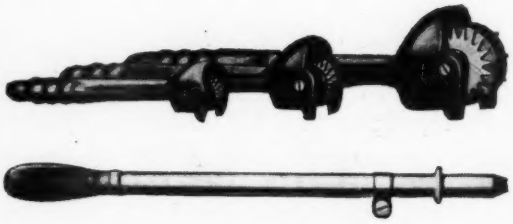
Over 10,000 Satisfied Users

INTERNATIONAL ELECTRIC COMPANY
MANUFACTURERS
ELECTRICAL HEATING APPLIANCES
INDIANAPOLIS, U.S.A.

Write for folder, "Electricity in the Manual Training Department"

"International Electric Heaters are Better"

GRINDING WHEEL DRESSERS



We manufacture every type of Grinding Wheel Dresser and are the recognized leaders in this line. Our catalog contains facts on the case of Grinding Wheels that every mechanical student should know. We will gladly send it on request.

Special Offer—We will give free to any vocational school asking for it, one of our No. 5 Diamo-Carbo Dressers selling at $4.00 each.

Desmond-Stephan Mfg. Co.,
Urbana, Ohio.

Educational
SAW CHARTS FREE

Set consisting of 4 blue prints, 18″ x 24″, each containing accurate information and details of the making of Steel, Hand Saws, Circular Saws and Files.

Write today for your set.

Simonds Manufacturing Co.

"The Saw Makers"

Fitchburg, Mass.

No skill of hand can offset the handicap of poor tools. Even if the result is obtained, much time has been wasted.

Buy good tools. Keep them in good condition. Use each for the purpose for which it was made. They will repay you by helping your hands to do their best work.

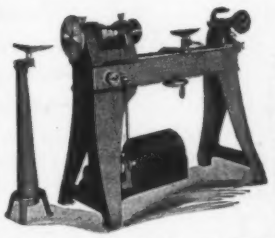
GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

LITTLE GIANT

MANUAL TRAINING DEPARTMENT SPECIAL EQUIPMENT



LITTLE GIANT WOOD LATHES.

Individual Motor Driven, or Belt Driven from above or beneath.

Furnished with either Bench or Floor Legs. Wide choice of optional tools and equipment. Four Speeds.

Many new, exclusive and practical features. All bearings are Hyatt High Duty Roller Bearings which greatly reduce power required. Ball thrust bearings at all points of end thrust.

Sold on 30 days' trial, and GUARANTEED FOREVER against defective material and workmanship.

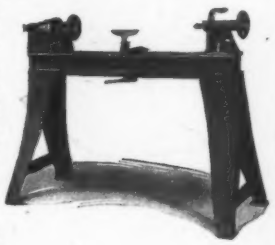
LITTLE GIANT METAL LATHES.

Individual Motor Driven, or Belt Driven from above or beneath.

Furnished with either Bench or Floor Legs. Wide choice of optional equipment. Three speeds.

Many new, exclusive and practical features are also found on our metal lathes. They are fitted to receive attachments for grinding, milling, gear cutting, etc., all of which we will furnish at a small fraction of the cost of separate machine for such work.

Sold on 30 days' trial and GUARANTEED FOREVER against defective material and workmanship.



LITTLE GIANT POWER HAMMERS.

Individual Motor Driven, or Belt Driven from above. Hundreds of different form-forging dies for instruction purposes.

Standard equipment with leading Technical and Manual Training Institutions.

Sold on 30 days' trial, and GUARANTEED FOREVER against defective material and workmanship.

DO NOT OVERLOOK

Metal Working Equipment in your school. Wood can never be made anything else, while metal working and alloying are in their infancy.

The Industrial Leaders of the world, to a very large extent, began as metal workers.

Wood working is artistic, and trains mind, eye and hand to deftness. Metal working does all this, and more. It is also practical, and the graduate invariably finds a position waiting for him, while the wood working department graduate usually takes up something else and his instruction is forgotten.

Little Giant Equipment for Technical and Manual Training Schools consists of a full line of all metal and woodworking machinery, including accessories and tools for same.

On Motor Driven Equipment, information will be required as to current, voltage, phase and cycles of motor.

Our business commenced in January, 1876—more than 45 years ago—and our Little Giant Products are used throughout the world. We are anxious to serve you for we can do it well.

Quotations and descriptive literature can be secured from any jobber, or direct from us.

LITTLE GIANT CO.

223 Rock Street, Mankato, Minn., U. S. A.

"Silver" Band Saw
Made in 20, 26, 32 and 36 inch sizes.

"SILVER"

Drilling Machines and Band Saws

(Equipped with or without motor)
Also Manufacturers of Jointers, Sawing Saws and Saw Tables

In "Silver" Woodworking and Machine Shop equipment every provision has been made for ease of operation, accuracy, speed, economy in upkeep and reliability. The excellence of design and workmanship has been known to users since 1854—66 years. From time to time certain refinements have been added, making "Silver" equipment in some respects, just a little better, until today it is conceded to be the most durable and efficient in its class.

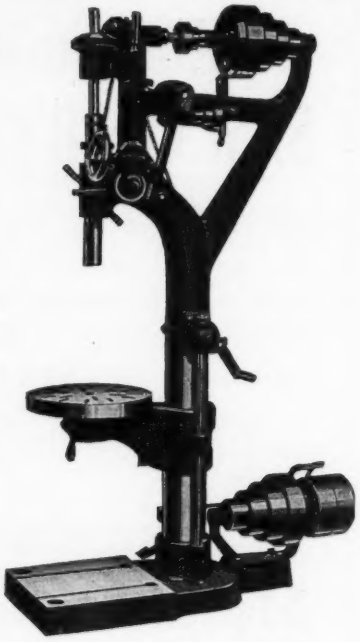
Let us send you a copy of our catalog.

Our catalogue, one of the most complete of its kind, will be sent you on request.

The Silver Manufacturing Co.

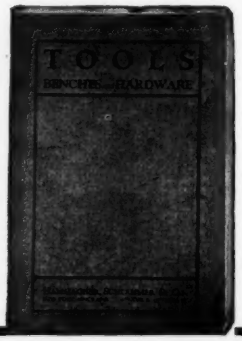
Established 1854

SALEM, OHIO, U. S. A.



"Silver" 20 Inch Upright Drill
Made in four distinct styles—round or square base—also made in gangs of two, three and four spindles.

LONDON PARIS BRUSSELS NEW YORK GENOA SIDNEY CAPE TOWN



GOOD TOOLS

ARE ESSENTIAL FOR

GOOD WORK

Since 1848 we have adhered to one policy — to handle only the very best in quality.
Our 300 page catalog illustrated above is of particular value to those interested in Manual or Vocational Training. If you haven't a copy ask for catalog No. 223.

Hammacher, Schlemmer & Co.

4th Ave. and 13th St., NEW YORK (Since 1848)

"Buy by the Cypress Arrows"

"SIGNED LUMBER IS SAFE LUMBER"
SO INSIST ON TRADE-MARKED "TIDE-WATER"

CYPRESS

Lumber—Because it's "The Genuine Wood Eternal"
& LASTS & LASTS & LASTS & LASTS

Tell your lumber dealer about it.
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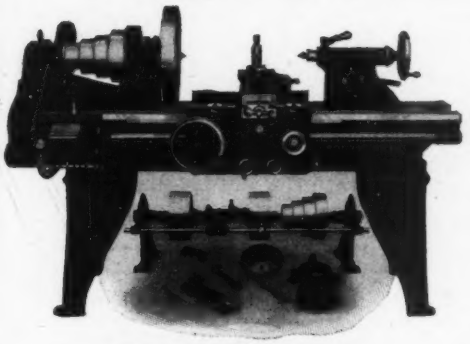

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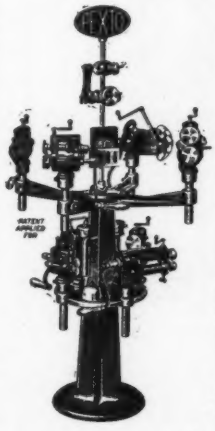

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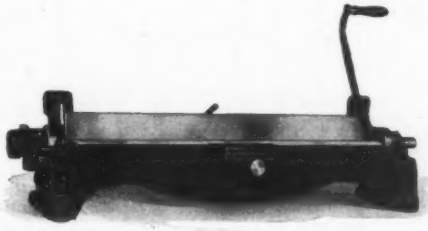

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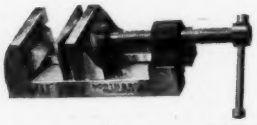

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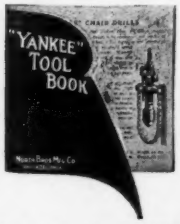

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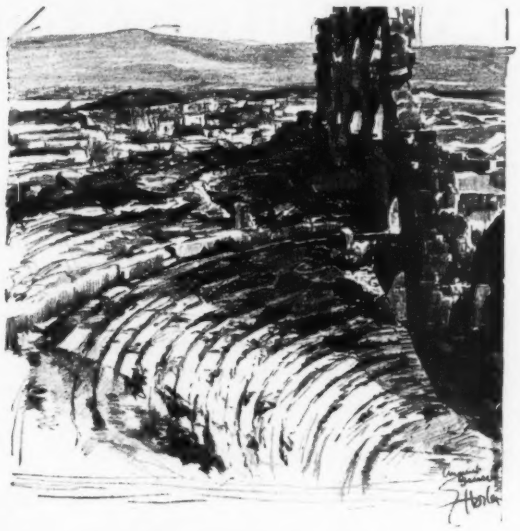

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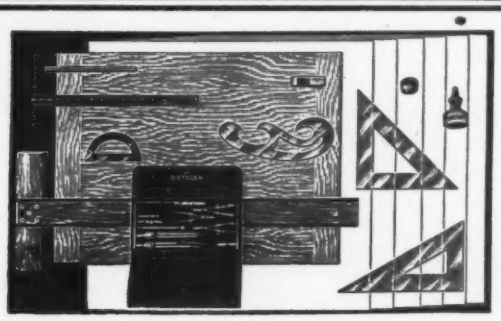

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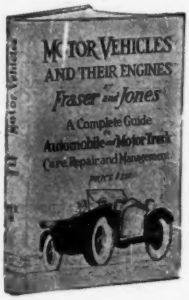

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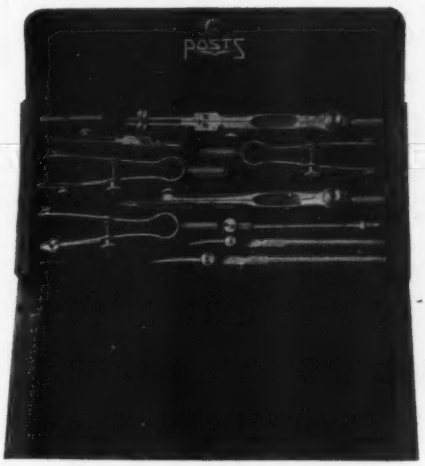

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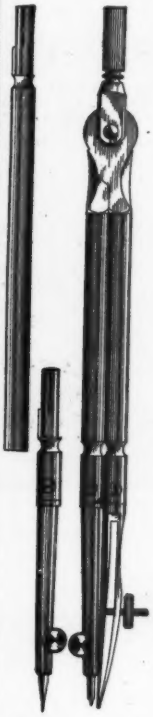

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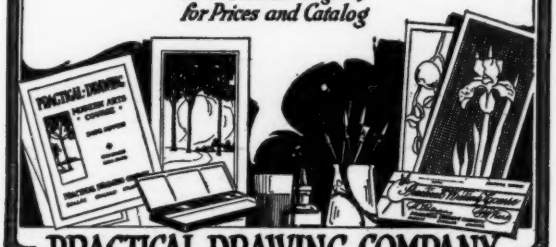

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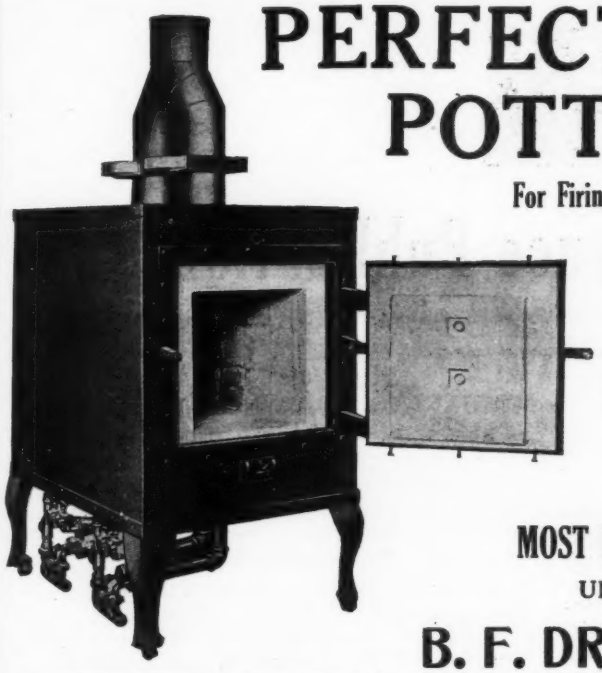

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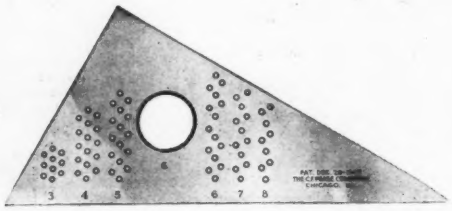

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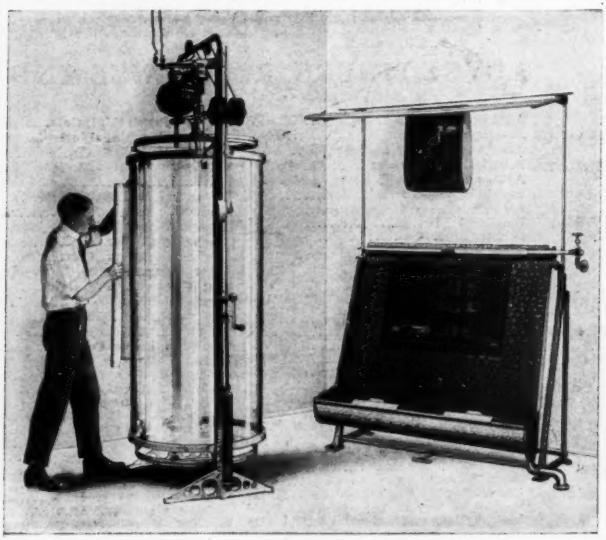

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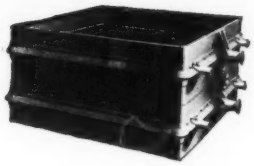
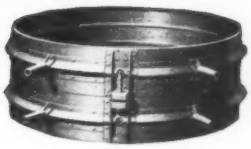
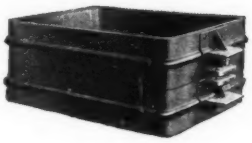
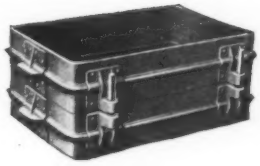




Sterling

The Perfect Flask





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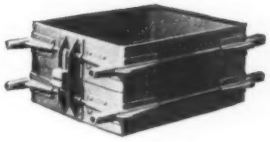

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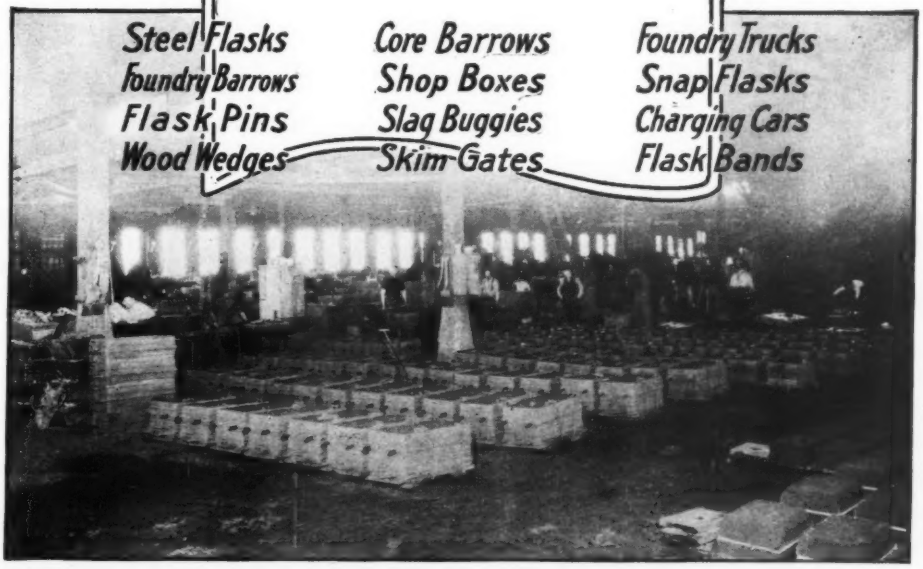

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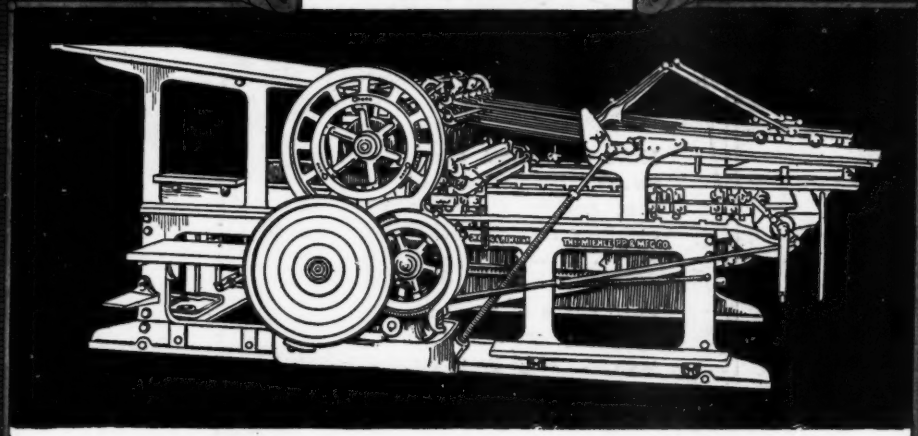

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